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The most widely accepted practices and recent developments in the floor maintenance field are presented as an aid to school custodians and administrators. It is important that operations and maintenance men develop inexpensive, efficient methods of treatment which will give the floor maximum protection and service, make it look its best, and enable it to be cleaned quickly and easily. Areas covered include--(1) types of floors, (2) daily floor cleaning, (3) periodic floor cleaning, (4) floor conditioning, (5) floor maintenance finishes, and (6) maintenance tips. (RK)

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FLOOR CARE

RESOURCE MANUAL

CUSTODIAL TRAINING COURSE

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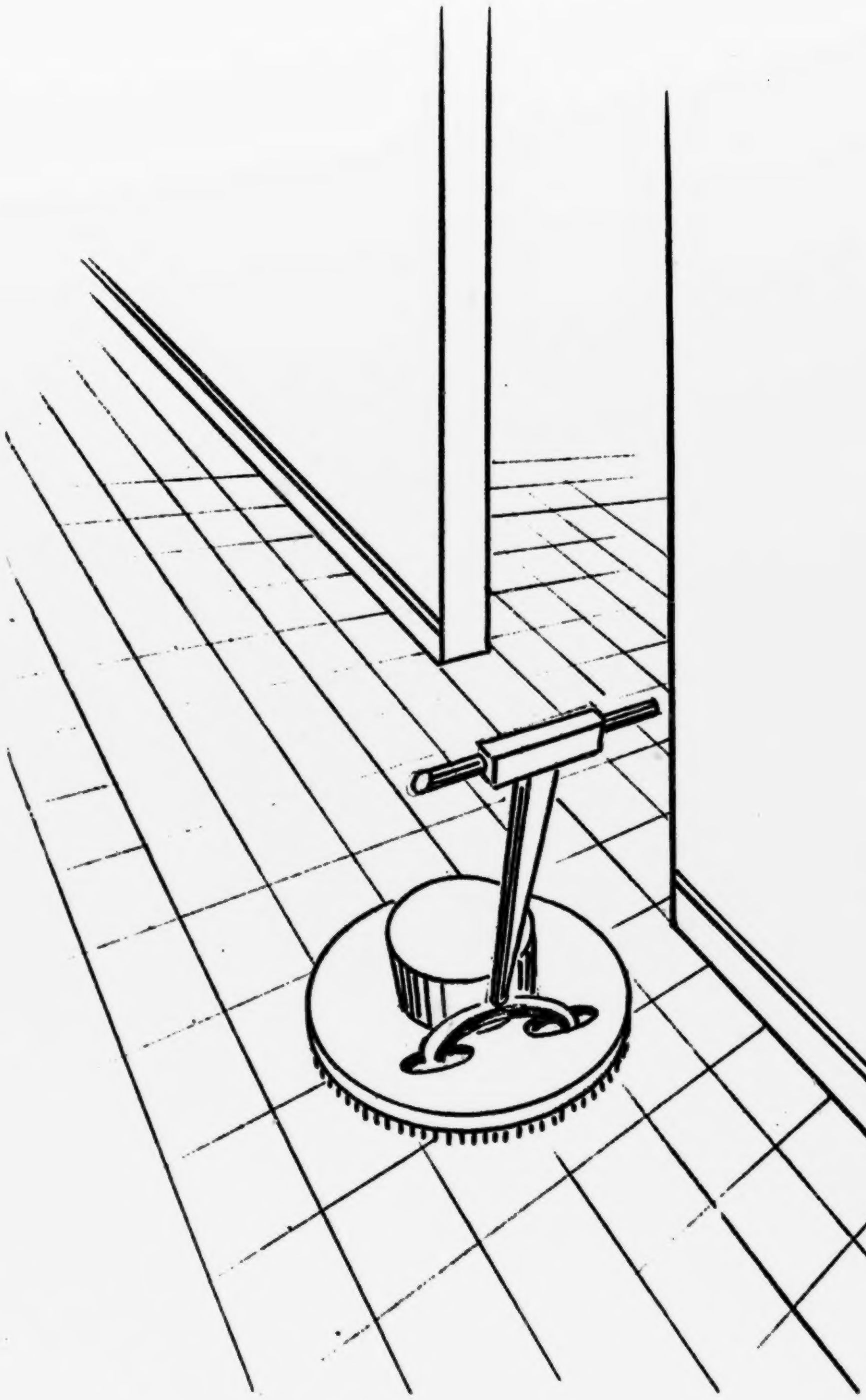
STATE DEPARTMENT OF EDUCATION
FLOYD T. CHRISTIAN, SUPERINTENDENT
TALLAHASSEE, FLORIDA

RESOURCE MANUAL

for

CUSTODIAL TRAINING COURSE #2

FLOOR CARE



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FLOOR CARE

Purpose

Proper care and treatment of the floors, day in and day out, is a very important factor in the operations and maintenance of the school; this is a fact which must not be overlooked or minimized. Floors probably receive the hardest use of any part of the building; up to 90 percent of the total building usage. They are used every minute the building is occupied.

The health and safety of the staff, teachers, and pupils are affected by the manner in which the floors are maintained. Dust raised from a neglected floor is a potential source of disease. Loose dirt, sand, and litter on the floor increase the possibility of falls.

The investment floors represents is a great deal of money; on the average 6 to 10 per cent of the cost of the building. With construction and replacement costs giving little evidence of decreasing, it is false economy not to provide adequate care and maintenance in order to realize the full expected life from floors and floor coverings.

One of the first things a visitor notices on entering a school is the appearance of the floors. Regardless of how well kept the walls, ceilings and fixtures, this beauty is lost unless the floor is also well kept and attractive. The morale and attitude of the teachers and students are affected by their surroundings. Their respect and treatment of their school and their attitude toward the custodian is directly related to the cleanliness and appearance of the school environment.

The school floors are affected by climate, soil conditions, and the surfacing on the playground. The operations and maintenance men must develop inexpensive, efficient methods of treatment which will give the floor maximum protection and service, make it look its best, and enable it to be cleaned quickly and easily.

This course is presented as a summary of the most widely accepted practices and recent developments in the floor maintenance field in an effort to aid school custodians and administrators in their daily efforts to keep their school floors clean, safe and sanitary, and their appearance a credit to the school and its staff.

Objectives

1. To impart a knowledge of the composition and characteristics of the different types of floors installed in our schools.
2. To teach the safest, most modern methods of day-to-day upkeep of the different types of floors.
3. To teach safe techniques for the removal of the more common stains found on floors.
4. To give a thorough knowledge of the procedures for the use and care of floor equipment.
5. To explain the composition and methods of use of cleaners, sealers and floor finishes.
6. To teach techniques of preparing, sealing, and finishing different types of floors.
7. To increase the knowledge and ability of the custodian to aid in evaluating the materials and equipment provided him.
8. To stimulate the interest of the custodian in floor maintenance and the desire for further study in his spare time.

ACKNOWLEDGMENTS

The materials in this manual were prepared by Mr. Luther S. Smith, Coordinator of Custodial and Maintenance Training, with the assistance and advice of Mr. Nelson E. Viles, Jr., Consultant, School Plant Management and Insurance. Information came from many sources including the literature in the field and experience gained while working in the school districts.

Appreciation is extended to the many members of the Florida School Plant Management Association for their encouragement in the development of this manual.

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CHAPTER 1

TYPES OF FLOORS

Types of Floors

There are many kinds of flooring used in schools. For each type, there is a preferred method of preparation, preservation and maintenance; floors are grouped in this study under the following headings: wood floors, masonry floors, and composition floors.

Wood Floors

Wood floors are generally thought of as either hard or soft wood floors. However, there are many variations. Probably the most common wood used in hard wood floors is maple. Northern hard maple is dense; the better grades are white in color and free from knots. If properly maintained, maple flooring will outlast the building. It cleans easily, polishes under wear and is resistive to indention.

Oak provides a hard floor that resists wear. It is darker in color than maple and when quarter sawed, presents an attractive appearance. Oak is porous and must be filled. Some oak tends to splinter along the edges if not treated; this makes it less desirable for gymnasiums and playroom floors.

Of the softer woods pine, fir, and spruce are most often used for school floors. They do not wear as well and are more susceptible to stains than hard woods. If laid with the flat grain exposed, these floors are inclined to splinter and sliver.

There are two kinds of wood flooring which are known as "wood block". One of these, known as "parquette", consists of several strips of conventional flooring made into a panel or tile form. While the strips in each block are parallel to each other, the separate blocks are laid so that the strips are at right angles to each other to form a woven effect. This type of flooring, which is usually oak or maple, is finished and maintained exactly like strip wood floors.

The other type of wood block flooring is made of separate or assembled wood blocks installed on end with the grain in a vertical position. This type of wood block flooring is frequently treated with creosote tar oil, especially adapting it for use in shops and industrial areas and is commonly known as "creosote block flooring".

The basic function of the wood block flooring of the vertical grain type is that of the "chopping block", such as the heavy block tables used by butchers for chopping and cutting meat. The end grain of the wood absorbs and withstands heavy blows, eliminating splintering and resisting abrasion. Such a floor still possesses a degree of resiliency which makes it less tiring under foot than concrete, but still provides much of the durability of concrete. The wood blocks are usually installed over a concrete base.

In the case of creosote block floors, after the blocks have been installed, hot pitch (melting point 155°-165°F) is squeegeed over the surface and forced into the joints with a rubber edged squeegee, leaving as little pitch as possible on the surface.

The maintenance of creosote block flooring is simple. Creosote treatment is sufficiently dust absorbant so sweeping compounds are not needed. The floor is to be swept as needed with a stiff fiber push broom. Scrubbing is rarely, if ever, called for. It is, of course, understood that creosote wood block floor is strictly utilitarian and, therefore, the appearance depends upon merely keeping it clean and free from litter, oil drippings and other accumulations. Oil absorbents should be available where oil from machinery is likely to drop on the floor. If such an absorbent is not available, spread fine sawdust over the oil and let it set until the oil is absorbed.

Masonry Floors

Those floors which will be considered under the general heading of masonry floors in this course include concrete, terrazzo, marble, ceramic tile, and quarry tile.

Concrete is made of a mixture of rock, aggregate, sand and cement. The quality of a concrete floor depends upon the mixture, the composition, the curing and the finishing process. If the concrete is mixed in the proper proportions, properly finished and cured, it should show little blooming (dusting), checking, spalling, and pitting. If a concrete floor is not cared for properly, it may become ugly and rough with many surface checks and pits or holes. If it once starts to wear, dust will float in the air and grit will be carried to other finished floor surfacings. The composition of concrete makes it susceptible to action from any acids, strong bleaching agents, and oils.

Good terrazzo has a smooth surface that is at least 70% marble chips and less than 30% neat Portland cement matrix, which is ground to a smooth finish. Varied and pleasing patterns can be formed by the use of colored marble chips and brass or aluminum dividing strips. Terrazzo does not need an artificial surface; its sheen and luster are natural and should last a lifetime. Terrazzo is not slippery but an applied artificial surface can make it slippery.

Marble is a natural product of crystallized rock composed of carbonate of lime. There are three types of marble used in buildings: highly polished marble used on walls; "honed" or dull finish marble used on stair treads and some floors; and floor marble, which has a sand finish for floors, stair tread and platforms.

Ceramic tile is made from burnt or "fired" clay, an aluminum silicate material. The surface may be glazed or unglazed. Glazed tiles have a glassy finish over the surface of the clay, and is used mainly for surfaces other than floors where the glassy surface will not be worn out by foot traffic. Unglazed ceramic tile does not have this glassy surface. The tiles are set in cement grouting to form a floor. The tiles themselves are hard to destroy but the "grout", being cement, can be harmed by strong caustic or acid cleaners.

Quarry tile is also cemented with grout. They are larger and heavier than ceramic tile and are usually red, brown, buff or gray in color. They are used in corridors, kitchens, and terraces. Caustic or acid cleaners will attack the grout around these tile also.

Composition Floors

The following types of floors are commonly grouped under the heading of composition floors or "resilient" floors. Technically speaking, wood floors are also considered resilient floors, and have been covered in a previous section.

Asphalt tile is made of asbestos fibers, mineral pigments, asphaltic and resinous binders. While it is quite tough, also fairly flexible at 70 degrees Fahrenheit and above, it becomes stiff and brittle when cold and will break before it bends. Asphalt tile has been quite popular for school floors because it is low priced, resilient, durable, easily installed, and is available in many patterns and designs. Even though it is durable, it does have some weaknesses. Greases, oils, gasoline, naphtha, carbon tetrachloride and turpentine soften or destroy asphalt tile. Being a soft floor, it is also subject to denting and gouging.

Rubber tile is made from natural, synthetic, and reclaimed rubber, inert materials and color pigments. Rubber tile has many desirable features; it is quiet, resilient, and resistant to stain, abrasion, cracking and crazing. Because of its toughness, it will withstand greater weight without breaking; about 200 psi, as compared to 25 psi for asphalt tile, 75 psi for cork, linoleum, and sheet vinyl, and 125 psi for vinyl-cork. It is not difficult to care for, but oils and greases, caustic soaps, benezene, naphtha, turpentine or extremely hot water will injure it.

Vinyl asbestos often resembles asphalt tile so closely it is difficult to distinguish between the two. It is relatively hard and smooth like asphalt tile. Its resiliency and resistance to indention (25 psi) are about the same as asphalt tile, but usually the colors are brighter and more distinctive. It is important that asphalt not be mistaken for vinyl-asbestos or it could be ruined by the wrong type of maintenance. To be sure about an unfamiliar floor of this type, wet a white cloth with gasoline, turpentine, lighter fluid, etc., and rub a dark tile. If the cloth is discolored, the floor is asphalt.

Vinyl-plastic is as flexible as rubber tile and about as resilient, with an indention resistance of about 200 psi. It can be mistaken for rubber tile. As in the case of maintaining the asphalt tile, it is important that rubber tile not be mistaken for vinyl-plastic. The latter is often referred to as "pure" or "100% vinyl", though it is neither of these.

Sheet vinyl is made in rolls and installed like linoleum. It is flexible and resilient, very much like vinyl-plastic tile. Neither the sheet vinyl or the vinyl-plastic tiles are perceptibly affected by the cold, but vinyl-asbestos becomes stiff when cold and brittle if very cold though somewhat less than asphalt tile.

All true vinyls have one virtue in common: they are immune to grease, oils, ordinary solvents like gasoline, naphtha, etc., and are highly resistant to ordinary acids and alkalis. They are unaffected by moisture and are not subject to decay.

One of the chief ingredients of *linoleum* is linseed oil, hence its name. Battleship and inlaid linoleums also include cork, resin, and color materials. All of these are pressed into and tied with a burlap backing. As a rule, the battleship linoleums are gray, green, or brown in a solid color. The inlaid is similarly made, except there is a color pattern.

Made almost entirely of ground cork, *cork tile* is the "springiest" of the resilient floors. This is due to the fact that cork is composed of millions of tiny 14-sided cells which entrap microscopic bits of air. The walls of these cells are very thin-but very strong-tissues of cellulose which are held together by minute but tough resinous membranes. These tissues and membranes constitute less than 50% of the total volume of cork. Air spaces constitute the remainder of the volume.

Although cork is the least resistant to pressure, it does not have the quick and permanent recovery of rubber and the flexible vinyl tiles. It does, however, have a maximum static load limit of 75 psi which is about three times that of asphalt tile.

There is also now a new vinyl cork tile which has the wearing surface of pure clear vinyl plastic, fused into the surface of cork tile, and is said to combine the wearing resistance of vinyl with the appearance of regular cork tile. Otherwise, it is to be regarded and maintained exactly as a vinyl floor rather than as cork tile.

CARPETING

Many people consider any textured soft floor covering as "carpeting". Technically, the carpet industry classifies any soft floor covering which is not fitted and anchored to the floor as "rugs". Carpeting covers the entire, or a large portion of, the floor, is custom fitted to the area, and then anchored permanently into position.

The material used to make carpeting of the type generally laid in schools varies widely. Basically, the material can be natural, man-made, or a mixture of both.

The most common natural material used in institutional carpeting is wool. Some of the advantages of wool carpeting are: it is the most resilient underfoot, it resists matting in traffic lanes, it resists fading better than the synthetics, it burns very slowly and extinguishes quickly without smoldering, and doesn't show soiling as quickly as the synthetics. However, it should not be used in band practice rooms since the spittle from the instruments will leave a stain which is almost permanent.

Acrylics and modacrylics are the synthetics most like wool. They have medium to high resilience, high wear life, medium to high soil resistance, and clean easily. Both melt and become sticky at rather low temperatures (400F- 500F) and the acrylics burn readily, giving off toxic fumes. The acrylics are generally blended with wool or modacrylics to reduce flaming unless Acrilan 41 is used. The modacrylics are more flame resistant and their low moisture absorption discourages soiling and resists liquid stains.

Nylon requires more frequent cleaning than wool because it shows soil more quickly. But it cleans very easily, offsetting this disadvantage.

Nylon has medium resilience and its higher abrasive resistance makes it more durable than wool or the acrylics. Nylon has a greater tendency to matting and when blended with wool, has a "pilling" tendency -- the tendency of staple nylon used in blends with wool to form pills that stay attached to looped pile textures because of nylon's high strength -- but this is reduced with the use of continuous filament nylon in 100% nylon loop pile woven velvet carpet.

Vinyl carpet is actually a sheet of vinyl with protruding knobs resembling carpet pile. It is applied over a foam rubber pad to give the necessary resilience underfoot. This covering doesn't scuff and is easily cleaned, but shows dirt and soil very readily. This covering is impervious to liquids and may be cleaned with water and a detergent.

In summary, it appears that wool pile fiber remains the standard for comparison because, properly blended, it has a combination of qualities most desired. While man-made fibers cost more per pound initially, the cleaner, more consistant synthetic fibers allow better utilization of the materials resulting in an end product which is generally cheaper. The selection of the material for carpeting will depend upon the use of the particular space under study, as well as considerations other than maintenance.

CHAPTER 2

DAILY FLOOR CLEANING

SWEEPING

Tools and Supplies Required

This section is devoted to a description of some of the tools and supplies found to be satisfactory and some suggestions for the use and care of these tools. In a few instances suggestions are also given for making equipment, although where a good commercial tool can be bought at a reasonable cost, it is uneconomical to use homemade substitutes. Time used in making homemade equipment might be better employed in the performance of other duties. Your choice of the proper cleaning tools will determine both the effectiveness of your cleaning and the ease with which you will do your work.

Counter Brush. The counter brush, a very desirable custodial tool, is used to pick up dirt with a dust pan after the dirt has been swept in a pile with a floor mop or floor broom and for getting into inaccessible areas. It pays to get a good quality counter brush. Cheap brushes wear out on the front end very quickly. The bristles become matted and curl until they cannot be used. Some districts make a counter brush available in each classroom for teacher-pupil use. These brushes need not be of as high a quality as do those used by custodians because they do not receive the same amount of use. The better quality brushes have a nine-inch head and are made of 60% bristle, 30% horse hair, and 10% fiber, with tufts extending three inches out of the block. It should be kept dry and clean and should be hung up when not in use. A mop comb can be used in cleaning the bristles.

Floor Brush. With the adoption of dust mop sweeping by more and more schools, the use of the floor brush is greatly reduced. This is desirable, for good brushes are expensive. Present day brushes are made of such materials as horse hair, nylon, acrylonitrile or tampico fiber. Combinations or mixtures of these materials have been used to good advantage. To some of these mixtures a row or two of fine wires have been added in the center of the brush to increase the stiffness. The nylon bristle floor brush is especially satisfactory. It has replaced the hog bristle and horsehair brushes for many uses. The nylon brushes are quite stiff, wear well, and work efficiently on nearly all types of floors, even those that are excaptionally dirty. The bristles are impervious to oil, grease, acid, and alkali.

Floor brushes are manufactured in variables of two inches in head length. The standard sizes range from 10 inches to 36 inches. The most common sizes used in schools are 24 inches and 30 inches.

In some of the older school buildings, especially those with wooden floors or floors that get very muddy and dirty, new brushes are still used first in the classroom and then after they have become somewhat worn, in hallways, boiler rooms, and on sidewalks. However, brushes are usually bought for specific purposes, as for example:

1. Nylon-centered brushes with horsehair on the outside for cleaning shops.
2. Brushes with fine horsehair bristles for use in wood shops.
3. Stiff nylon brushes for sidewalk cleaning.
4. Horsehair brushes for general litter cleaning.

Brushes should be purchased with handles six feet in length. The length of the handle can then be adjusted to suit the individual user in this way: first, insert the handle in the brush and stand the brush on its bristles; then mark the handle on a level with your eyebrows. Saw and round the top at this mark.

In using the brush, place the palm of one hand over the end of the handle and with the other hand, palm downward, grasp the brush further down. Holding the brush this way enables you to use it while standing erect and prevents cramping of your wrist.

Lint and other dirt which gathers in the brush should be combed out thoroughly each day with a mop comb described later in this section. Because of the stiffness of the bristles, it is seldom necessary to comb a nylon bristle brush.

After use, the floor brush should be hung up by the handle with the bristles turned away from the wall and the head at least 6 inches from the floor. Change the brush handle from one side of the head to the other each week so that the sides of the brush are worn evenly. Some custodians paint a small number 1 on one side and the number 2 on the other side of the block of the floor brush. Then they place the handle on the number 1 side of the block for the first and third weeks of each month and on the number 2 side for the second and fourth weeks of the month.

If you have a floor brush that is badly curled from misuse, it may be treated in this way:

1. Comb the brush with your nail comb.
2. Fill a tub about half full of lukewarm water to which has been added two ounces of a detergent for each gallon of water.

3. Swish the brush in the solution for about two minutes.

4. Rinse it in clear water.

5. Hang the brush up wet (do not shake out the water).

   Let the bristles hang straight down so that the air can pass through them.

6. After several days drying, the bristles should be straight and lively again.

Radiator Brush. The radiator brush has a very narrow, long, row of bristles set into a flat wooden or twisted wire handle for reaching into very narrow crevices. This brush was originally designed for removing lint from between the sections of the old steam radiators. It is excellent for cleaning behind and in closely built radiators and underneath heavy furniture.

Corn Brooms. The corn broom still has many uses, such as sweeping in odd shaped and out of the way places, sweeping water and in wet areas, and on steps.

Corn brooms are manufactured in several sizes and of different qualities. The standard sizes of these brooms are determined by the weight per dozen and the number of times the brooms are sewed. Sizes used by custodians are:

Extra large	32 lbs. per dozen	6 sew
Large	30 lbs. per dozen	5 sew
Medium	20 lbs. per dozen	5 sew
Toy	6 lbs. per dozen	2 sew

The Toy size frequently is used with a dust pan on a handle to clean up such places as lobbies when they are in use.

Dust Pan. The custodian makes so much use of the dust pan that it pays to get a rugged one. It is important that it not be too small. The household type is too light for custodial use. However, districts which supply a dust pan for each classroom will find the household size very satisfactory for that purpose. The dust pan should be of rugged metal approximately 10 1/2 x 16 inches. It should be heavy enough to hug the floor, thus facilitating the picking up of the dirt.

Dust Mops. Dry mops for sweeping are often known as dust mops and are used extensively for daily cleaning of smooth floors. Even if a floor brush is used to remove most of the dirt of a classroom, the dry mop is used to remove dust and fine dirt. Most dry mops have a wood or metal frame to which a wooden handle is attached. Over this frame, the mop head is placed or tied. Usually, the mop head is made of short strings 4 to 6 inches long which are attached to and through a heavy canvas tube. The sizes of mops commonly used for schools are 18 inches, 24 inches, 36 inches, and 48 inches.

Mops can be purchased which are as wide as is desirable and practical. The width most suitable for the given job may vary. In rooms with stationary furniture, the mop should be narrow enough to go between the legs of the desks without being forced. For classrooms having the old No. 5 or No. 6 desks, a mop 18 inches wide should be suitable. In rooms with movable furniture, a mop 24 inches wide can be used. For halls many custodians have found that a mop from 32 to 36 inches wide is better than a narrow one. For gymnasiums use a 48 to 60 inch mop. The larger sizes used extensively for corridors and gymnasiums usually have a metal or wire brace from each side of the head to the handle for bracing. Many custodians prefer a metal frame head because the thinness allows it to go under low furniture. Matrons and maids prefer the metal frame for its lightness.

Dust Mop Heads. For many years the strands of mop heads have been made of cotton. Recently, mops are being made available with the strands made from nylon or other synthetic material. There are several companies manufacturing these mops and each have their own trade name or brand. Mops made of this material are more expensive than those made of cotton, but they seem to have several advantages. They do a good job of sweeping and they are easier to wash and they outlast cotton. These new mops need only to be soused up and down in warm (not hot) water in a mop sink and then hung up to dry. A few drops of neutral cleaner may be added to the water, but it is not essential. Cotton mops need considerable washing to keep them clean. It is much easier if cotton mops can be put into a washing machine or sent to the laundry.

Since most dust mops are used on asphalt or rubber tile, they should be treated with a non-petroleum-oil treatment. (Petroleum oils soften and stain asphalt and rubber tile.) A properly treated mop picks up dust without turning it into a ball of dirt. At the end of each day, the dirt should be shaken out of the mop and, if more treatment is needed, apply by hand sprayer into the mop and let it stand until the next day. A mop head which has been properly washed and treated will appear clean and fluffy. A good method for re-treating clean mop heads involves spraying them with mop treatment, rolling them up and storing them in a plastic bag or closed metal can until ready for use. Clean, dirty, and treated mops should be stored in a closed metal container. Do not store them in piles, bags, or boxes as they are a fire hazard.

Dust mops already treated with the proper chemicals are available through several industrial linen service companies on a rental-use basis and do away with the problems of replacement, cleaning, and treatment of mop heads.

Sweeping Tool Covers. In areas where only light soil or dust is encountered, a device known as a "sweeping tool" has gained some popularity. The sweeping tool block, usually of wood with short bristles around the bottom perimeter, is attached to the handle by a double swivel. A soft, treated, canvas cover, sometimes sewed into a tube, sometimes open, is slipped over the head for floor dusting. When one side becomes saturated with dust, the cover is reversed to a clean face.

These treated covers also double as dust cloths in some institutions, simplifying stocking and insuring uniform dust pickup. These covers also are usually handled by industrial linen supply companies on a rental basis.

Recently, several large manufacturers have developed a sweeping tool cover made of non-woven cloth fibers pressed into a cloth-like sheet, treated with a dust holding preparation, and packaged like paper towels. These cloths are disposable after use, avoiding the cleaning and re-treating problems. When used for floor dusting, they are attached underneath a wooden or metal block by spring clips around the edges of the block. They can be used either for floors or furniture dusting.

Vacuum Cleaners. The term "industrial" in its relation to vacuum cleaners is used to distinguish the large tank-type machines from the smaller household kind. However, the term might be misleading since domestic machines are equally as well adapted and as generally used for institutional and commercial use.

In the matter of dust removal, it is obvious that no other method approaches the suction of the vacuum cleaner in efficiency and the more powerful the suction, the more effective it is. While the basic principle of all vacuum cleaners is the same, there are a number of designs for accomplishing the desired results. Most of these machines are fitted with tanks varying in capacity from 5 gallons up to 50 gallons, though the popular sizes run from 10 to 20 gallons. The idea of the tank is to provide capacity for large accumulations of dust, small litter and water. In the case of dry accumulations, most of them which are sucked into the tank fall to the bottom of the tank while the floating fine dust is trapped by a filter.

Although there are occasional machines with a floor tool attached directly to the tank, whereby the machine itself is pushed over the floor, most industrial vacuum cleaners employ a wire reinforced hose usually about 12 feet long. The hose is generally lined inside with rubber; though if oily or greasy material is to be picked up, the hose should be lined with neoprene, which is immune to oils and grease.

While most industrial vacuum cleaners are designed with the motor on top of the tank, a few are installed on the side or bottom. In the newer interior filter models bypass motors are used, in which case the motor is separated from the air flow and is separately air cooled. Where dirt accumulations cannot be reached with suction, the hose is attached to the exhaust and used as a blower.

The picking up of water is one of the most effective functions of an industrial vacuum cleaner. Usually, a rubber squeegee is attached to each side of the floor tool and by tilting the handle up and down, one side or the other of the tool scrapes the water under the orifice. The vacuum cleaner draws the water out of cracks and corners impossible to reach with any other device. Where an abrasive cleaner has been used on the floor, the vacuum cleaner removes the abrasive grit which, if left on the floor, may cause scratches.

In using the vacuum cleaner, begin cleaning at the machine and work away from it, dragging the cable and hose. This prevents backing into them. The newer accordian type vacuum hose stretches and retracts as needed. It is more convenient to use but some think the convolutions inside the contracting hose cause obstructions to the flow.

To obtain maximum benefits from the vacuum machine as well as to preserve the machine itself, it must receive proper care.

After using, empty the machine. This is essential if the machine has been used for picking up water, particularly scrub water.

Many of the tanks are now made of stainless steel, brass, or copper in which case there is no danger of rusting, but any dirty water will become stale and soapy water may turn sour. If allowed to dry in the tank, crust may form up on the sides and a slimy deposit on the bottom presenting a difficult cleaning task.

Keep the outside of the machine clean by wiping it off frequently. The users' respect for the machines wanes as he allows it to become dull or dirty.

The hose and tools should be kept clean inside and out. Soapy water should be flushed out with clean, clear water.

If the machine is to be used as a blower, be sure it is dry inside.

The most important item to keep clean is the filter. If it becomes clogged , the efficiency is greatly reduced and the strain on the motor is increased. The outside bag should be turned inside out and brushed with a stiff brush. If possible, vacuum clean it while it is reversed.

The inside filter bag should be removed and the bottom brushed or cleaned by reversing the air flow through the filter.

Avoid getting moisture on or into the dust filter causing the "taking up" of the mesh or pores of the filter. Most industrial vacuum cleaners which are adapted for wet pick-up have provided safeguards against such conditions. In many instances, the internal filter bag is replaced with an interchangeable metal "suds shield". An automatic shut-off device which prevents over filling of the tank is employed either with or without the suds shield.

Store your industrial vacuum cleaner in a clean, dry place. Wind up the cable and lay or hang it on the machine. Roll up the hose and place it where it will not be kinked or stepped on.

Sweeping Compounds. Keep in mind the fact that there are better methods of cleaning floors than the use of sweeping compounds.

Practically all sweeping compounds are made of sawdust, sand, and parafin oil. Some have pleasant odorants and some have dyes added for color. Compounds with much sand and little sawdust are naturally less expensive than those made of more sawdust and less sand. The cost per pound means little. Even moist sawdust makes a fair sweeping compound.

Sweeping compounds can be injurious to asphalt and rubber tile. The sand cuts wax finish and the oil often found in sweeping compounds causes deterioration of asphalt and rubber tile. If you use a sweeping compound, use the type which has a wax-base treatment instead of oil-base to safeguard floors.

Mop Comb. Dry mops and wet mops last much longer and do a better job if the strands are not allowed to become snarled up. This can be prevented by combing the mops when necessary before they are put away. A comb can be made by taking an 8" wide piece of 3/4 inch plywood and shaping it to have a handle and then driving finish nails into one side to form the teeth of the comb. The nails should be spaced 3/4 inch apart and should be approximately 2 inch finish nails. After the nails are in place evenly, a file can be used to smooth down the heads so that the mops will not be damaged by the sharp edges.

SWEEPING PROCEDURE

All floors that have been used during the school day should be swept once daily, with the exception of kindergarten rooms which should be swept once for each half day they are used. Corridors and entrances leading from the playgrounds and street should be swept after each entrance of pupils.

Basement corridors, furnace rooms, fan rooms, or other infrequently used areas should be cleaned early in the afternoon. The floors which receive more use should be cleaned at such a time that the work can be finished before school is dismissed. Pick up dirt immediately. Take care to see that no piles of dirt are placed so that students passing from one classroom to another will track through them or scatter the sweepings.

Kindergarten rooms can be swept as soon as the pupils from these rooms have left the building. Classrooms can be cleaned after the pupils have left the building in the afternoon or they can be scheduled for cleaning during a vacant period of the day.

The custodian should not clean any of the classrooms during the school day without first securing the necessary permission or approval from the superintendent or from the principal in charge.

Sweeping classrooms with fixed seats. One important daily task is cleaning or sweeping the classroom floors. It is the area on which the custodian's work is most often judged. There are many kinds of classroom floors and there are many different ways to sweep a classroom floor, so it is desirable to devise a suitable plan. The following procedure gives a general routine by which a classroom with fixed seats can be efficiently cleaned:

Close the classroom windows, adjust the shades or blinds, empty the pencil sharpener into the teacher's waste basket, and then empty this into a large container in the hall. Begin sweeping from the front corner of the room opposite the front door; sweep along the side of the room under the windows and deposit the dirt at the rear of the room. Starting at the rear, sweep the dirt from under the desks in the row nearest the windows, pushing it into the next aisle. When you reach the front of the room, push the dirt in the aisle to the back of the room. Repeat the process at the next row of seats and so on until all the room has been covered. Bring the final accumulation of dirt across the back of the room, up the side aisle, to the door. Now clean the area at the front of the room, around the teacher's desk. Take all the dirt into the hallway, shake out the mop and pick up the dirt with a floor brush and a dust pan and place it into the dust box.

Sweeping classrooms with removable furniture. A room with movable furniture is easily cleaned. Start next to a wall and clean the space between it and the first row of seats. As the space next to a seat is cleaned, take the dust mop handle in one hand and with the other pull the seat into the space just cleaned as the sweeper passes by. This will leave the space on which the seats have been sitting during the day exposed for sweeping. When you have reached the end of the row, sweep back up the next aisle, including the old aisle space, and the space on which the first row of seats had been sitting. Do the next row of seats the same as you did the first and continue until the room is finished. When this is done, the seats are all in rows and will not have to be straightened. The next day begin on the side of the room opposite to the one started with the preceding day. This will keep lanes from being worn in the floor.

It should not be necessary to lift the mop from the floor while sweeping. Keep it in contact with the floor as much as possible, lifting it only when it is necessary to free it from the dirt and dust which can be shaken loose by giving the mop a few vigorous jerks. The dust pile should be removed with a dust pan.

Sweeping Corridors. Corridors carry a tremendous volume of traffic and often this means a large amount of dirt and litter. During rainy weather the children may carry in a considerable amount of sand, dirt, or cinders from the unpaved school ground, and entrances will get a considerable amount of dirt. Foot scrapers, rubber mats, and the like outside the building help to reduce the amount that enters a building. Rubber mats or fiber mats at the door entrances to corridors will help keep dirt from being carried down the hallways. This accumulation of dirt should be picked up as soon as possible after the children are in the building in the morning and at noon, as well as after recess periods in the elementary schools. This will prevent the tracking of dirt into other parts of the building. If the corridor floor is extremely dirty, it should be damp mopped.

Two tools are necessary to the sweeping operation, a floor brush and a non-oily treated dust mop. If there are unusual shaped projections breaking up the corridor walls, such as drinking fountains, radiators, flower urns, etc., a straw broom will also be necessary. First, sweep around the obstructions where the floor brush or dust mop will not reach. Then, start at one end of the hall or wherever you want to pick up the dirt when you finish. Move in a straight line down the hallway and return, overlapping the two strokes. Shake out the dirt and move on down the hallway and return a second time if necessary. If you are using a four foot wide mop, the second trip may not be necessary. Pick up the dirt with a floor brush and dust pan and place it in the dust box.

Sweeping Gymnasiums. Since gyms are large and have little, if any, furniture, they are easily cleaned with a large four to five foot dust mop treated with a non-oily treatment. A daily cleaning is almost a necessity. With a floor brush or straw broom, starting at the entrance and working around the perimeter, sweep the dirt away from the edges of the walls and from beneath the equipment. Now with the dust mop, push the dirt to the rear of the gym and return, overlapping the strokes several inches. Shake out the dirt and repeat the process over the entire floor. Now sweep the dirt piles together and pick up the dirt with a floor brush and a dust pan. Place the dirt in the dust box. Since many gyms are used by gymnastics squads, a fine metallic powder may be found on the floor after their practices. This powder is used by the team members to make their hands slick so that the skin on their hands will not be pulled, but it also makes the floor slick. A very small amount on the soles of gym shoes will cause the wearer to slide. Ordinary mop treatment and sweeping compound will not remove this dust from the floor, but several schools have found the following treatment to be quite satisfactory:

Secure a type of mop treatment which may be used on wooden floors only. It may be necessary to experiment with several types before finding one that will be satisfactory. Treat the dust mop and mix some of the treatment with soft, pine sawdust and use it like a sweeping compound. If the floor is extremely slippery, spray some of the treatment in the air over the floor and allow it to settle. Let the treatment dry for 24 hours before using. Then the floor should be perfectly safe for playing basketball.

In many schools it is necessary to use the gym floor for dancing, or auditorium activities. For dancing a slick floor is needed. Corn meal can be used, but it cuts the finish. Shoes with leather soles are hard on gym finish. Borax flakes or crystals sprinkled on the floor provide the slipperiness needed for dancing and will, to some extent, protect the floor. A damp mop may be used to remove the borax crystals. If the floor remains slick, it may be damp mopped with warm water.

Sweeping Auditorium. If the auditorium has fixed seats, the procedure which is used by many large theaters may be used. Usually the large theaters use regular straw brooms to sweep between the seat rows into the aisles. The aisle is then swept into piles and, with a dust pan in each hand, the sweeper scoops up the heavy litter and deposits it in the trash cart. The remainder of the fine litter and dust is picked up with a dust pan and a counter brush.

If the seats in the auditorium are not fixed, then the seats can be stacked to one side and the procedure used for sweeping gym floors can be used on the bare auditorium floor. Or, depending upon the size of the auditorium, the procedure used for sweeping classrooms with movable seats can also be used in the auditorium.

Sweeping Stairs. If it is a narrow stairway, a conventional straw broom is best suited for the purpose. Beginning at the top of the stairs, with the sweeper standing at a convenient distance below the top step, an outward thrust of the broom is given in the right hand corner. Then the step is swept from right to left where an outward thrust of the broom drops the accumulation to the step below. The first operation is now repeated by sweeping from left to right, etc., back and forth down the stairway.

A wide stairway can be swept in the same manner, though it may be more convenient to sweep toward the center while the operator is walking up to the top which will save time and also allow the stairs to be used while being cleaned. When the sweeper reaches the top of the stairs, half the job will be finished. Then the operator sweeps down the remaining half of the stairs to the bottom.

In sweeping a stairway which joins a wall, always sweep toward the wall. If there is no wall and both sides of the stairway are open, then it would be best to sweep from both outer sides toward the center.

It will be well to remember the following points in sweeping, both for speed and efficiency: As much as possible, keep your sweeping tool on the floor. Avoid lifting it more often than necessary. This is, of course, more difficult to do with a broom than with a brush or dust mop, but in lifting a broom or brush, avoid the flitting action of the bristles which tends to throw the dust. Make the strokes as long as the space in your own arm will permit. Long strokes do a better, faster job than a series of short ones and are less tiring to the sweeper. Use only good floor tools.

CARPET CARE

Every carpet should be vacuum cleaned or swept daily to remove surface soil and litter. An industrial type vacuum cleaner with a beater-bar action has been found most efficient in soil removal as the brushing action makes it possible to clean all the tufts, and at the same time prevents carpet pile from matting down. If that is unavailable, an industrial vacuum (suction only) with a rug tool attachment will be adequate. A manual floor sweeper will do an adequate job of removing small litter, lint, and surface soil from traffic lanes between regular vacuuming, but will not remove embedded soil and sand.

In addition to daily cleaning, all carpeting requires occasional wet or dry cleaning. Done properly, such cleaning will remove soil that daily vacuuming cannot reach and will restore the original brightness of the carpet as well as prolonging its service.

Carpets are cleaned either in plants specially equipped for this purpose or cleaned where they are laid or "on location". In-plant cleaning is generally used for rugs, soft floor coverings that are not fitted and anchored to the floor, but can be easily picked up. Wall-to-wall carpeting is usually cleaned on location. Though it can be removed, if desired, for plant cleaning, it will require restretching and reanchoring to the floor.

In many cases the plant cleaning of rugs is recommended since the plant facilities make possible a very thorough cleaning job. This includes a scrubbing with detergents, rinsing, wringing, drying, pile restoring, and stretching. Many modern plants are equipped to clean large rugs as well as small ones.

In "on location" cleaning, which is most universally used for wall-to-wall carpet installations, the methods used by professional cleaners require materials and equipment that are usually not available to the average custodians. The cleaning of rugs and carpets, other than occasional spot removal, should not be attempted by a school custodian but left to the professional carpet cleaner. A discussion of spot removal from carpeting is contained in the following section.

Spot and Stain Removal

Supplies. Because of the variety of the stains found on linoleum, tile, and wood floors which require various chemicals to remove them successfully, and due also to the danger of improper use of these chemicals, it would be advisable for you to confine yourself to the use of water, soap and water, detergents, or commercial bleaches. However, if they do not take out the stain, the following information will help you. You need to know what the stain is and the properties of the chemical being used. Materials that may be used for removing stains may be classified under three headings: Absorbents, Volatile solvents, and Bleaches.

Absorbents.

- Cloths
- Detergents
- Blotting Paper
- Sawdust
- Talcum powder
- French chalk
- Dry cement
- Fuller's earth

Absorbents prevent the stain from spreading and from penetrating into the floor. Apply the absorbent immediately when any substance has been spilled on the floor. This will facilitate quick removal of the stain. If a stain removing-solvent is applied freely, the absorbent may be used to prevent the stain from spreading. Work from the outside of the stain toward the center.

Volatile solvents.

- Cleaning solvents
- Alcohol
- Carbon tetrachloride
- Acetone
- Turpentine
- Ether
- Benzol

Most stains are greasy and are soluble in volatile solvents. The selection of solvents for stains of this nature is a matter of preference since many solvents are very much alike.

Bleaches.

Chlorine
Javelle water
Chloride of lime
Hydrogen Peroxide
Oxalic acid
Ammonia
Permanganate of potash
Household bleach

The art of chemical bleaching is comparatively new. All bleaching depends on chemical action with oxygen, either with the oxygen of the air or oxygen in a chemical solution. Bleaching is the actual removal or destruction of the pigment, not a neutralization of its color.

Wet the stain surface with the bleach and allow it to dry slowly. Do not rub it with a cloth or remove the bleach until it has done its work. Then neutralize it with a neutral soap or detergent. Good quality inks are very difficult to remove, and ordinary commercial bleaches have no effect whatever.

Stain Removal Technique

It should be understood that no formula is infallible and that in many cases small preliminary tests should be made in the least conspicuous places. It is also recommended that in all cases of removing stains that you begin at the outer edge and work toward the middle, thereby preventing the stain from spreading.

In our suggestions, poultices are often recommended for removing certain stains. A poultice is an absorbent powder made into a thick paste with hot water or with the proper liquid chemical. First, the stained area should be wetted with water, or the recommended solution which you will be using for removing the stain, and then the poultice applied from 1/4 to 1/2 inch thick. It should be allowed to dry 24 to 48 hours. Theoretically, the solution has penetrated the surface and as the poultice dries, the penetrated moisture is drawn out into the drying poultice and the stain along with it. Therefore, ample drying time is essential. Although the poultice may be dry on top, it is still absorbing the embedded moisture underneath.

The following techniques refer to some of the more common specific stains:

Blood stains. Fresh blood can usually be removed from non-porous floors with clear water or a detergent. It may tend to penetrate such floors as terrazzo, marble and cork. To remove penetrated stains or to remove old blood stains, wet the spot and sprinkle freely with malt diastase. Distribute evenly and allow to stand for an hour. Then rinse.

Chewing gum. Apply dry ice until the deposit is brittle enough to crumble off. If dry ice is not available, use ordinary ice, although it is slower. A bucket full of chipped ice pushed slowly over a gum spotted floor and followed promptly with a scraper is sometime effective on large areas. Carbon tetrachloride poured around a gum deposit (not on) soaks under the deposit and loosens it.

Cigarette burns. If not too deep, steel wool will often remove them. Soap and water will make the steel wool more effective.

Coffee stains. Dilute one part of glycerin with four parts water. Apply to the stained area with a cloth saturated in the solution. Allow this to soak for fifteen minutes, and then flush with water. If this fails on any floor except linoleum, cork, marble, or terrazzo, apply a poultice of javelle water and whiting. To remove difficult coffee stains from linoleum, cork, marble, or terrazzo, apply a strip of cotton batting saturated with hydrogen peroxide and over this apply another strip saturated with ammonia. On floors other than linoleum, cork, marble, and terrazzo, very difficult stains may be removed by sprinkling some crystals of oxalic acid on the wetted stain. *WARNING. Oxalic acid is very poisonous.*

Human and animal stains. If a recent occurrence, sponge with several applications of lukewarm water, wipe dry, and follow with a solution of one part vinegar to three parts water. If an old stain, try the suggestion for removing rust.

Synthetic Dye Inks. The bright red, green, and violet inks are synthetic dyes in water. Such inks contain no acids and do not etch the floor. Often ammonia water or liquid household bleach applied with a piece of cotton will remove them.

Ordinary writing ink. Make a strong solution of powdered laundry bleach in hot water. Mix this to a thick paste with powdered chalk or whiting, which may be bought at any paint or hardware store for a small price. Apply a layer 1/4 inch thick and let dry. Remove the poultice and if some of the stain remains, repeat the operation.

Ink on wood and resilient floors. First, try a neutral cleaner. If not successful, try ink remover or a solution of one part sulfuric acid in four parts water, or 1/2 ounce oxalic acid to 1/2 pint warm water. Always rinse well.

Ink on marble and terrazzo. Avoid acids, all of which dissolve marble. Use a solution of sodium perborate; two teaspoonsfull dissolved in a pint of water. Add whiting to form a paste and apply as a poultice 1/4 inch thick. Allow to dry. If a blue color remains, repeat the operation. If a brown stain remains, treat as a rust stain.

Indelible ink from any floor. This includes ink pads, ball point pens, etc. Wipe the stain with cotton saturated with ammonia or javelle water. Or apply a poultice of equal parts of chlorinated lime and whiting. Add sufficient water to make a paste.

Iodine stains. On any floor apply ammonia. If a stain is deep and old, apply cotton batting soaked with ammonia until the stain disappears.

Oil and Grease from all floors. There are especially prepared oil and grease absorbents which many dealers carry in stock. If none are available, try the following: Saturate a layer of cotton batting with hydrogen peroxide and lay over the stain. Saturate a second layer of cotton with ammonia and place over the first. Repeat this process until the stain is removed.

A simpler process for wood, rubber, vinyl, or concrete is to make a poultice of equal parts of TSP (or prepared oil solvent) and whiting. Unless the prepared oil solvent is a liquid, add hot water. Do not use this alkaline solution on linoleum, cork, marble, or terrazzo. Rinse thoroughly.

Oil Stains. These stains are not difficult to remove if treated at once. Wipe up the oil as soon as it strikes the floor. Then cover the stain with a dry powdered material, such as powdered chalk or Portland cement which will absorb the oil. If the oil stain is an old one, repeat this operation daily until the stain is gone.

Linseed oil, Fats, Greases. Cut a piece of white flannel larger than the stain, saturate it with equal parts of lacquer thinner and acetone and apply it to the stained area. Cover it with a small slab of marble. When the cloth dries, saturate it again. If the solvent spreads the stain, use a larger piece of flannel. Repeat if necessary.

Paint or varnish. Use a paint and varnish remover or make a thick solution of TSP and water and apply it to the spot. Keep it wet for five minutes and scrub using steel wool if necessary. Since alkalis must not be used on linoleum, cork, marble, and terrazzo, use non-alkaline paint remover or carbon tetrachloride. On linoleum and cork use dry No. 2 steel wool alone, though carbon tetrachloride may also be used with the wool. The fumes of carbon tetrachloride can be dangerous if breathed to excess.

Rust stain from any floor. Use one part sodium citrate crystals to six parts water and add an equal portion of glycerine. Make into a poultice with whiting. Allow two or three days to dry.

Silver nitrate stains. Apply iodine. Allow to dry and then remove both stains with ammonia.

Other stains on marble and terrazzo. There are common stains on marble and terrazzo such as caused by improper mopping etc., which can be removed with a poultice of abrasive cleaning powder and hot water. First, go over the spot with clear hot water and apply the poultice. For an extensive area such as on the cove between floor and wall, make a "white wash" of the abrasive powder and hot water and apply with a brush to the wetted area. Let dry and then scour with the same solution and a stiff brush. Rinse well.

REMOVING STAINS FROM CARPETING

While carpeting is not found in many schools in any great amount, a few schools do have rather extensive areas of it, and many of them have at least some in small areas.

This section suggests some methods for removing certain common stains with materials which might be obtained without too much difficulty. However, it must be remembered that an incorrect diagnosis of the nature of the stain or of the materials from which the carpet is made could produce results which could ruin the carpet. If the exact nature of the carpet, with the manufacturer's cleaning instructions, are not known or the exact chemical nature of the stain thereon, then the removal of the stain should be left to commercial specialists in carpet cleaning.

Human and animal stains: In many instances the carpet should be shampooe before attempting to remove the stain. An exception is where urine (human or animal) is involved. Stains from urine may be only dimly visible before shampooing, but become vivid discolorations after shampooing. Where urine is involved, if fresh, remove as soon as possible with clear water and follow with a weak vinegar solution (25% in water). If the stain is an old one, removal is a "gamble". Try a solution of one part sodium citrate crystals to six parts of water, added to an equal amount of glycerine. The difficulty is to remove the stain without removing rhe color of the carpet. However, specialists can sometimes restore the color by spot application.

In any case, in order to preserve the fabric, the stains should be removed, even at the expense of discoloration, as such deposits often cause decay.

Oil and Grease: Including road oil, can usually be removed with naphtha. If merely on the surface of the carpet, rubbing with a naphtha moistened cloth will suffice. If the oil or grease has penetrated the carpet, place an absorbent pad under the spot and hand brush the spot with a liberal quantity of naphtha. Of course, there is the danger of leaving a ring, but this can be minimized by cleaning the outer edges of the stain first. If a ring is left, usually complete shampooing of the carpet will remove it. In fact, any spot cleaning of a dirty carpet will make a contrast that only a general cleaning will eliminate. Sometimes it is advisable to give a general shampoo before removing the spot.

Sugary substances: For the removal of candy or other sugary substances, clear warm water should be tried first. If this fails, add a little soap or neutral synthetic detergent. Alcohol, diluted with an equal part of water, may be tried next.

Chocolate stains: Use alcohol nine parts to one part stronger ammonia. Use sparingly or you may strip the color from the carpet.

Milk and Ice Cream: Usually shampooing will remove such stains. If not, sprinkle the spot with malt diastase and distribute evenly with a clean brush. Allow to stand one hour and rinse with water. Or, after the carpet has been cleaned and is free from alkali, apply the malt and pour warm (not over 140 degrees F.) water over it. Allow to stand for fifteen minutes and rinse. Alkali from any soap left in the carpet, combining with the malt and warm water, may cause stripping of the color.

Tobacco: Use the same formula suggested for regular ink.

Soft drinks: If the stains cannot be removed with clear or soapy water, use the formula recommended for removing regular ink.

Alcoholic drinks: Use the same method as described for soft drinks.

Cigarette burns: If deep, the burns cannot be removed. However, the damaged section can be replaced with new carpeting or covered with a throw rug. If the spot is merely scorched, use a piece of coarse, dry steel wool to clean the ends of the pile.

Rouge: Shampoo first. If this fails, use equal parts of denatured alcohol, acetone and glacial acetic acid (99%). Avoid getting the cleaner on the hands as it may cause a skin burn; it will not harm fabrics, except those of a cellulose acetate nature.

Rust: First clean the carpet. Then apply 12 1/2% of hydroflouric acid. Rinse thoroughly and neutralize with 10% ammonia. There are also several good manufactured compounds for removing rust stains from cloth which may be effective.

Mildew: Can usually be removed with 10% ammonia. In bad cases of mold, shampoo and then go over with 10% solution of permanganate of potash.

Blood: Is partially removed by shampooing. Then use malt diastase as directed for milk and ice cream.

Chewing gum: Dry ice applied to the deposit will make it brittle enough to crumble off. A ring of carbon tetrachloride around the deposit will soak under it and loosen it. Be careful about inhaling the chemical fumes.

Roofing tar: Remove in the same manner as chewing gum.

Ink stains: Except when stains from pad or ball point ink are involved, try shampooing first. If this fails, apply a solution of four parts denatured alcohol, one part each of glacial acetic acid (99%), oxalic acid, and glycerine. Rinse well and follow with 10% ammonia. This formula should not be used on cellulose acetate carpeting.

Do not wet stamp pad or ball point ink stains with water as water tends to set the stain. Try naphtha, or ammonia. If it is an expensive carpet, call a carpeting expert.

CHAPTER 3

PERIODIC FLOOR CLEANING

MOPPING

As commonplace as the mopping of floors may seem, it still lends itself to systematic methods which can improve the efficiency of the operation. Not only can time and labor be saved, but better results are possible.

Generally, the mopping of a floor is a routine job mechanically done with the operator's mind on other things. It is simply a matter of going over the surface with a wet mop with no particular system in mind, in which case it can be an unnecessarily tiresome task with mediocre results. In many cases, only a part of the soil is removed. The balance is dissolved and distributed uniformly over the floor. Thus uniformly distributed, the stains of traffic are less evident and the floor looks cleaner, but the ultimate result is the gradual accumulation that builds up an overcast, dulling the colors, designs, and the original luster of the floor.

First of all, efficient mopping calls for the proper technique, of which three items are essential: the proper tools, the right cleaning materials, and the correct method of using the equipment.

Equipment. The essential tools are the mop, the mop bucket, and the wringer. Mops consisting of long strands of twisted cotton yarn or narrow cellulose strands are best suited for mopping. These may be permanently attached to the handle or they may be of the detachable type. The medium size mop commonly used for mopping larger floor areas weighs twenty ounces and contains seventeen inch strands.

The mop bucket may be a single bucket, preferably on casters for easy maneuverability, or it may be two or three buckets on a dolly. One of the buckets is for the cleaning solution and the other for rinse water. In that instance where three buckets are used, the third bucket is used to receive water which is wrung out of either the solution mop or the rinse mop.

The wringer, which is indispensable for best results, may be either of the double roller type ot it may be of the lever-pressure kind. The latter type is the more popular, being much more efficient and less destructive to the mop.

Materials. While clear water mopping is common practice, the use of detergents in addition is frequently needed, conditions being the governing factor. But it is to be remembered that some floors are sensitive to certain kinds of detergents. Alkaline cleaners should not be used on linoleum and cork tile, while soaps should not be used on rubber. For general purposes, the new synthetic detergents containing neither soap nor alkali seem best suited.

Where waxed floors are to be mopped, effective cleaning can often be accomplished by adding a little water wax to the mop water instead of a detergent. The water wax itself serves as a detergent and during the mopping process replaces about as much wax as it is likely to remove. About one pint of water wax (of 12 per cent solids) to three gallons of water should be about right.

Procedure. Before starting to mop, it is necessary that the floor be swept. The initial removal of loose dirt and litter with brooms, floor brushes or dust mops will not only lessen the labor of mopping, but will extend the effectiveness of the cleaning solution.

A certain authority has estimated that of the cleaning operation, about 40% of the time consumed is non-productive. That is the "get ready" time. Quoting this authority: "It is spent in gathering supplies, transporting them to the job, preparing cleaning solution, assembling equipment, etc. You will help your operators and increase their efficiency by providing them with an orderly storage space where supplies may be obtained, packaged, uncontaminated, and ready for immediate use without waste of time. This is indeed one point the sanitation director should consider well."

It is also suggested where several workers are involved in the cleaning operations that each worker be alloted his own tools, his mops and buckets to be used by him exclusively and for which he is to be responsible. Ready availability of water is also important for efficient cleaning, since a lot of time can be lost if the operator must travel any distance for each water change.

With all necessary equipment and cleaning solution on location and ready to begin mopping, the mop is dipped into the cleaning solution and then part of the solution squeezed out to avoid flooding the floor. Excess water is not only unnecessary on any floor, it can be damaging to the resilient floorings such as linoleum and cork tile and may seep between the tiles of other tile floors causing the tiles to come loose. Excess water can be detrimental to wood floors, especially oak. Also when more water than needed is used, the work of removing it is increased.

The correct method for efficient mopping consists first of the proper grasp of the mop handle, which is to place the right hand over the knob at the top of the handle with the left hand palm down about 14 inches down the handle. If you are using a handle without a knob, place the right hand palm up about 2 inches from the beginning of the handle.

Next, at the beginning of the stroke, stand with feet well apart. Place the mop flat on the floor about four feet to the left side. Then move the mop to the right in an arch-like stroke, parallel to the baseboard to avoid splashing the wall. The mop strands should be spread out for maximum coverage and the mop should be turned frequently to insure uniform wear. At the end of a nine foot (semi-circular) stroke, reverse the direction by stopping the mop and swinging it from right to left. By developing rhythm, no time is lost in the change of direction.

Compared with the above side-to-side stroke, it is said the incorrect push and pull method of mopping consumes about 1/3 more time. At the beginning of the stroke of the push and pull method, the arms of the operator are in an awkward position, and at the end of the stroke the operator is bent over in a fatiguing position, while the length of his stroke is limited to approximately four feet.

By use of the nine foot, side-to-side, arc like stroke, maximum coverage is obtained with the highest quality performance and the least amount of fatigue. By using this stroke, it has been found that approximately 100 sq. ft. can be cleaned with one application of solution. After wringing the mop and picking up the excess cleaning solution, it is recommended that the area be rinsed immediately with clean water using a second mop.

By using the above recommended method of mopping, the average time consumed by the operation was found to be 0.9 of an hour per 1000 sq. ft. Type of soil, obstructions, skill of the operator and other variables may cause this time to vary from 0.5 to 1.9 hours per 1000 sq. ft.

The frequency of mopping naturally depends upon conditions. Near entrances, and especially in bad weather, the floor may require mopping several times during the day, while in the less traffic areas, once a day or perhaps only once a week may be necessary.

Where it is necessary to mop during the time of regular usage, such as entrances, lobbies, etc., where people are constantly walking on the floor, caution must be exercised to prevent a slipperiness hazard. Hard, smooth floors can be slippery when wet and particularly so if the solution contains certain kinds of detergents. In such cases, it is advisable to mop half a floor at a time parallel to the path of traffic, barricading the wetted section.

For the most effective mopping results, rinsing and drying are essential factors of the operation. First, removal of as much of the dirty solution as possible with the original mop makes the rinsing water last longer. Then, a clean mop dipped in clean, clear water and allowed to partially drain is used to go over the clean area. The rinse mop is then returned to the rinse water, churned up and down and wrung as dry as possible to pick up the rinse water.

Regardless of the amount of rubbing or the effectiveness of the cleaning solution during the first stage of the mopping process, unless the rinsing and drying which follows are properly executed, the floor may be spotted or streaked.

When you clean the glass in a window, every little streak you leave is conspicuous. Inadequate mopping of the floor leaves the same kinds of streaks, but because the floor cannot be held up as a transparency to the light, streaks escape casual notice.

Cleaning Agents. A thorough knowledge of chemistry, while useful, is not a prime requisite of intelligent cleaning procedures. On the other hand, a working knowledge of chemical terminology regularly encountered in manufacturer's literature, periodicals, sales presentations, etc., is highly desirable if intelligent and maximum efficiency are to be obtained from cleaning materials.

In the main, the literature published by manufacturers is accurate and honest. Ever increasing policing of labels, claims and descriptive literature in general by the U. S. Department of Agriculture has gone a long way toward eliminating exaggerated and bogus claims and glossed over descriptions of cleaning supplies and their functions. With the ever increasing number of manufacturers and products, however, and the limitations of the USDA staff, there remains a large area to be covered before all trade literature and claims may be considered 100% accurate. Probably the best way to familiarize responsible maintenance and sanitation personnel with the chemistry involved in cleaning materials is to list the terms most frequently encountered, along with their every-day accepted meaning and comments. It is not the purpose here to cover each and every term or each and every exception to the rule. Rather, the run-of-the-mill phraseology in its common interpretation will be briefly discussed.

Even so, some of the terms used may seem over technical or wordy to some. However, scientific terminology is an exact statement of a name or quality of a material usually in one word or phrase and can rarely be replaced by as brief a statement in layman's language.

There are four main classes of cleaning agents which are of most interest to school custodians. They are: synthetic detergents, soaps, alkalis, and abrasives.

Synthetic detergents. A common term used when speaking of synthetic detergents is the word "syndet" made up from the two words "synthetic" and "detergent".

First, consider the syndets which are derived from a number of sources ranging from petroleum to animal fats and tallows. They are treated with various other chemicals to produce basically a compound which is resistant to many acids and alkalis and resistant to hard water in varying degrees. In fact, by tailor-making a syndet, various qualities can be incorporated into the finished product to fit it for a specific end use. This makes it important that the intended use be specified in requesting a syndet.

The majority of syndets are light amber in color, although they may be sold with various colors added to assist in identification or to give eye appeal.

The most common of the syndets are the anionic detergents. Historically, they are the oldest group. Soap is a member of this grouping.

Anionics have a property of removing soils with water by a form of coupling the soil with the water.

Anionics are relatively low in price, as the large majority of them are petroleum derived. This permits substantial amounts of them to be used at low cost.

One of the most common complaints about the anionics is their tendency to leave a powdery residue. This is caused first by over use and lack of rinsing the surface; and second, by the fact that most anionics are dry in their natural state. Good rinsing usually serves to alleviate the cause of such complaint.

Somewhat newer among the syndets is the class termed nonionic detergents. This type is made in such a way to form a syndet which is considerably more resistant to attack from other chemicals. Foam control is also somewhat simpler in the nonionic detergents.

The name is based on the fact that the component parts do not break down chemically or form ions. This is, of course, the basis of the stability of the nonionics--the inability of other materials which do form ions to find any part of the nonionic with which they can combine. This property also gives the nonionics an anti-static characteristic which is quite valuable.

Many new nonionic syndets have recently been developed with low foaming characteristics. This makes them particularly well suited for use in automatic scrubbing units.

It is probably well to emphasize at this point that in most cases, foam has little or no bearing on the cleaning properties of the material. In some types of material, approximate exhaustion of the solution may be predicted in a situation where the material has been a high or relatively high foamer on initial mixing. A diminishing or disappearance of foaming properties in such materials is a partial indication of exhaustion--but only a partial one. Foam should never be the prime criterion in judging a detergent.

Most specialized of the syndets is the class of cationics. Because of their chemical nature, these materials are usually considerably higher in price.

Cationics have more recently come into prominence because of their bactericidal activities. These are commonly referred to as quatenary ammonium compounds or "quats". An almost total absence of odor plus low skin irritation characteristics and high bactericidal activity, even in great dilution, have made the quats very useful. They are widely used in detergent-sanitizer types of compounds.

Cationics do not mix at all with anionics and when mixed with some of the nonionics, their potency is seriously diminished. Thus, the tendency of the layman to prepare his own disinfectant—cleaning mixture should be avoided. Improper mixing usually results in a total loss of the desired effects.

Syndets are usually compounded with each other or with certain alkaline materials to produce an end product. Proper compounding results in a finished product that is more effective than any one of the ingredients would be by itself. This procedure, again, is the primary function of the manufacturer who has pre-determined the most efficient combination for specific jobs.

In general, syndets were originally sold because of their resistance to hard water. While this is an advantage in most syndets, certain types are still not suitable for use in exceptionally hard water systems without additional compounding.

Soaps. Soaps are probably the oldest of the class of surface active cleaning materials. Since olden times, the simple process of manufacture has been known—that of treating tallow with lye usually leached from wood ashes. Modern technology has both improved soap quality and brought the price down. The commonest weakness of soaps as a group is their instability in hard water and their tendency to break down in even slightly acidic conditions. In acidic conditions, the soap reverts to a fatty acid, a material largely resembling the original fat in physical characteristics, and a soluble salt which is not apparent to the user and has no cleaning value. Thickness or viscosity of liquid soap is not necessarily indicative of the amount of soap solids present. Certain additives can make a thick or pasty soap from certain soaps and yet contain only 10 to 15% actual soap solids.

An important distinction in soap lies in the difference between liquid and solid or bar type of soap. Almost without exception, soaps derived from sodium hydroxide (soda lye) are solid soaps, while those derived from potasium hydroxide (potash lye) are liquid or paste soaps. This point is emphasized for those who are tempted to make their own liquid soaps from either bar soap scraps or soap chips. Bitter experience has shown the uninformed experimenter that while an opalescent liquid is the result of warming and dissolving such soaps, cooling causes solidification.

Soaps are disappearing from the institutional cleaning picture, but still find wide acceptance in toilet and bath items as well as in certain laundry applications.

Alkalis. Departing from the surface active class of maintenance materials we come to a totally different class from the chemical standpoint, that of the alkalis. The great majority of these materials is based upon sodium salts or various acids, usually the carbonates, phosphates, silicates, borates, and occasionally a few others. Since there are far too many to consider individually, we will group them into general classifications.

Phosphates are the commonest and TSP, or trisodium phosphate, is the time honored and overworked member of this class. It is often less reliable and harsher than some of the newer materials. Phosphates are generally used because of their tendency to prevent or remove hard water deposits resulting from a multitude of causes. They are also used in combination with syndets as "synergists", or assistants. Since the amount of phosphates is both a measure of effectiveness as well as being responsible for the performance of a material, the cost per pound of these materials is not a reliable yardstick by which to judge them.

Many of the newer phosphate compounds are quite complex molecules resulting from the fusion or chemical combination of simpler materials so as to form a new compound. This type of compound is more effective not only in eliminating the undesirable effects of hard water but often renders the syndets far more effective in performance. Complex phosphates tend to hold by-products of hardness in solution while the older TSP types allow feathery-appearing precipitates to form a deposit on surfaces.

Soda ash or sodium carbonate is another old standby in cleaning procedures. It is quite cheap and a good source of alkali. Careful consideration should be given where hand use is indicated as its alkalinity approximates TSP and quantity use may lead to skin irritation if protective gloves are not worn.

Borax was used quite extensively in past years as another alkaline cleaning agent. Its uses, however, are somewhat limited as it supplies relatively little alkali and sequestering power. It finds most extensive use in powdered hand soaps where its mildness plus low solubility make it a good source of alkali and a mild abrasive-like substance.

Alkalinity. The term alkaline has often been misused, as degrees of alkalinity (pH) vary with different materials. Thus, some compounds are harsher on the skin than others. This is caused by saponification (or making soap) from the combination of alkalis and oils of the skin, producing at first a rather slippery feel on the hands, followed by a pronounced dry effect. Prolonged exposure of this type causes extensive reddening, and even breaking of the surface of the skin.

Excessive alkalinity has a similar roughening effect on such materials as flooring, paint, etc. Thus, the most important question in the maintenance supervisor or purchasing agent's mind should be, "How alkaline is it?" Very often this can be ascertained by determining whether or not an excessive amount of free alkali is present. Literature of many manufacturers often states "No free alkali present", which is an indication that no sodium or potasium hydroxides have been added. On the spot tests with such items as litmus paper or phenolphthalein are not too reliable for this purpose as many commercial grade alkalis have a very small amount of free alkali present as the result of the method of manufacture. Further, the pH range at which some of the indicator papers or solutions change make them unreliable for determinations such as will interest the maintenance man. A salesman using these two indicators is usually relying on scare psychology rather than the actual result which might be indicated. If a reliable measure of alkalinity is desired, a sample of the compound should be submitted to a reputable chemical laboratory for both the determination and interpretation of results.

pH. Use of the term pH by both salesmen and customers without proper knowledge of its implications indicates that there is a need for a generalized discussion of its meaning.

pH—or hydrogen ion potential—is an expression of the acidity or alkalinity of a solution, electrically determined. A pH of seven is the point of neutrality, where neither acid nor alkaline conditions may be said to exist. Proceeding downward from 7.0 to 6.9, 6.0, 5.0, etc., is a progression in the direction of acidity which is totally reached—theoretically—at zero. Progression upwards from 7.0 to 7.1, 8.0, 12.0, etc., is a progression in the alkaline direction. The higher the number, the greater the alkalinity.

A true pH of exactly 7 is sometimes neither desirable nor practical, and too much stress has been placed on neutrality in cleaners. In most cases, a certain amount of alkalinity or acidity is necessary for good cleaning. Even soaps may have a pH ranging of up to 8.5 or 9.0 without producing any harsh effects on the skin. The USDA permits manufacturers to use the term "neutral" where the pH of a cleaner is between 7 and 10 and does not exceed 10.

To further illustrate the relative meaning of this term, let's consider some materials the average individual is familiar with, such as soft drinks which often range to 3.5; bicarbonate of soda-8.5; lemons-2.0; milk of magnesia-10.5; etc. From casual examination of these few materials it can easily be seen that exact pH figures do not mean much by themselves. Other factors must be taken into account.

Sequestering Agents. Probably the newest class of cleaning materials to enter the maintenance chemical field is the sequestering agent. Sometimes referred to as EDTA (Ethylene Diamine Tetra Acetic acid), these materials are not limited exclusively to EDTA but include several other compounds as well.

The most desirable feature in sequesterants is their ability either to dissolve or to hold in solution relatively large amounts of hard water salts so that they cannot effect the efficiency of soaps and syndets. This is done at a comparatively moderate pH range. Small quantities of sequesterants serve quite effectively and, in addition, enhance the efficiency of some syndets as a bonus quality.

The prime objection to sequesterants is their price — often ranging up to $2.00 per pound, in 400 pound lots. This precludes most industrial use and purchase of the materials by any consumer not fully equipped to take maximum advantage of their efficiency through controlled application. There are many compounds, however, which do make use of the sequesterant in the optimum quantities, thus taking advantage of all the bonus points at an additional cost of only a few cents. So used, the sequesterants are of great value.

Terminology of Soiling

Many exotic terms have been applied to different types of soils. For practical purposes, however, there is little need for complicating the maintenance supervisor's problem, for the commonly encountered soils can be grouped under a few general headings and the methods of removal can be adjusted to fit the existing conditions depending upon which types of soils are present.

Greases and oils account for one of the most common types of soil. They come from a host of causes, ranging from industrial or cooking fumes through body greases to actual lubricating greases and oils. They may be water thin in consistency or almost solid, depending upon the other soils mixed with them and upon temperature.

Oily-type soils are generally of two categories: (1) petroleum or mineral oil type, and (2) vegetable or animal type. As would be expected from the names themselves, petroleum types are generally inert or resistant to combination with most chemicals. For removal this necessitates a physical type of attack, such as emulsification, suspension, or even physical attack with mechanical agitation, as with a scrub brush.

Higher temperatures tend to soften this type of soil and make it easier to remove. Removal is usually accomplished with a solvent or a good emulsifier or suspending agent. The nonionic and anionic syndets adapt themselves well to this application, especially when formulated with the proper builders.

Vegetable type soils are usually more susceptible to the process of saponification: that is, to having themselves transformed into a soapy substance which is partially soluble. This saponification proceeds more efficiently at warm or hot temperatures. A relatively high pH is also quite helpful.

Carbon and earthy type materials form another important category. Included in this division would be such soils as clayish materials, soot, dust, and in short, all of the materials commonly referred to as dirt. These are usually insoluble in almost anything available, therefore, they must be removed by agitation and suspension. While still in suspended form, they should be thoroughly removed by rinsing or wiping.

Fortunately, most of these soils occur in a form combined with oils or greases and this renders them softer. If they have been deposited by themselves and become baked on in some fashion, removal is liable to become quite difficult.

Scale is usually the result of hard water or industrial waste accumulation and may even include rust, especially in areas where the iron content of the water is high. Rapid removal of scale is most easily accomplished with acidic material.

One important factor to be considered when contemplating removal is the nature of the underlaying or supporting surface. Terrazzo, marble, concrete, and oxychloride are quite similar to scale in their chemistry. Therefore, anything which will dissolve the scale will also dissolve these underlaying surfaces. On fine materials, such as marble, this type of soil frequently presents an almost unsurmountable problem.

Sequesterants will act upon scale, but since they are not selective, the fundamental problem is not simplified by their use.

It can now be seen that in removing various combinations of types of soils, a combination of ingredients must be chosen to fit the problem at hand. Thus, such things as combinations of scale, soil, and grease may require a specially prepared syndet of low pH tailored to fit the need. In the same manner, combinations of carbons and oils require specifically balanced formulations both to suspend and to emulsify or saponify.

Abrasives. In many cleaning operations, abrasive action is needed to remove stubborn soils. These abrasives are used in scouring cleaners and will remove the soil mainly by mechanical action. The type of abrasive cleaner to use depends largely on the nature of the work and the sensitivity of the surface to be cleaned. The most commonly used abrasives include pumice, quartz, ground silica and feldspar. Feldspar is generally recommended for heavy duty work. In addition to the hardness, the fineness of the abrasive is important, since the coarser the abrasive, the harsher the action; the finer the abrasive, the milder the action. Most abrasive cleaners are used for cleaning porcelain, enamel, ceramic tile surfaces and for removing stains from walls and other hard surfaces. They are used sometimes for a very thorough scrubbing operation on terrazzo, ceramic, or quarry tile. In any instance where abrasive cleaner is used in floor care, procure a grade from your sanitary supply house which is not of the chlorinated type, in other words, one which does not state on the label that it contains bleach. Such bleach can be extremely harmful to the floors. Always rinse the floor extremely well after using an abrasive cleaner.

Ammoniated cleaners. When performing a wax stripping job, many custodians in the past have added ammonia to a strong cleaning solution to aid in the removal of the old wax. Ammonia can be an excellent aid in wax removal because it helps by re-emulsifying the hardened wax. However, getting the correct amount of ammonia in the cleaning solution is mainly a matter of luck and experimentation. Most of the large manufacturers of cleaning chemicals now market an ammoniated, heavy-duty cleaner which will eliminate the guess work and speed wax removal. In addition, these ammoniated cleaners, when properly diluted, make excellent heavy-duty detergents wherever high emulsification power is needed for cleaning. In the interest of simplification and safety to the school floors, it is recommended that a commercially prepared ammoniated cleaner be used rather than the custodian attempting to formulate his own solution of this type. Always rinse well after using an ammoniated cleaner since the ammonia has a tendency to bleach the color from the floor.

Scrubbing Tools and Equipment

In scrubbing a floor, as in any other type of maintenance work, to get the job done properly in the shortest length of time and with a minimum effort, along with the proper chemicals, certain hand tools and equipment can be considered essential. While in some cases the job can be done with such simple tools as a mop, mop bucket, and wringer, in others heavier equipment becomes a necessity. In the following paragraphs are the description, use, and care of some of the more common pieces of equipment used for scrubbing floors in schools.

Mops, mop buckets, and wringers have been discussed in an earlier section pertaining to mopping procedures.

Floor machines. The term "floor machine" is more or less a generalization since it covers several types and a number of designs, but the primary function of all is to polish or to clean floors. The differences are confined to the different design factors and structure. The polishing process consists of buffing to create heat, while the cleaning action is to create abrasion.

One of two things is essential for comparable results in the use of a floor machine: weight or speed, pressure on the floor or swift friction. Therefore, the lighter the pressure, the faster the brush must revolve.

The federal government in its specifications has divided floor machines into two general classifications: the concentrated weight type, by which the transporting wheels are raised above the floor so that the entire weight of the machine rests on the brush; the divided weight type, the wheels of which remain in contact with the floor and help support the weight of the machine during operation.

When the concentrated weight machine is fitted with a single brush, it propels itself across the floor, being guided merely by raising and lowering the handle. Because it can be swung from side to side, it is considered faster in operation, covering a wider area, than the divided weight type. Also, since weight and speed are important factors in the efficiency of a floor machine, there is an advantage in having all the weight on the brush. But the use of the single brush, concentrated weight machine calls for a certain skill resulting from practice, a factor not necessary in the case of the divided weight machine, or in the case of the dual or multiple brush concentrated weight machine.

The divided weight machine may have one or more brushes and because the motor can be set back over the wheels, about half-way of the brush housing, the brush is cleared to permit use under low furniture, etc. This machine requires no particular skill or practice to operate, and while there is less weight on the floor than in the case of the concentrated weight type, greater speed of the brush may compensate in the way of effiency. The divided weight machine must be moved over the floor manually, and only backward and forward. It cannot be swung from side to side.

A floor machine is now being marketed with two speeds, a fast and a slower speed. Presumably, the fast speed is adapted for polishing while the slower speed is better for scrubbing.

Except for the large combination tank-type scrubbers, a scrubbing machine is generally a converted floor polishing machine. In fact, a regular polisher is often used for scrubbing by merely exchanging the polishing brush for a scrubbing brush, though a regular floor scrubber also includes a solution tank either on the handle or on the motor. Usually the tank can be fitted on any polisher and the flow of the cleaning solution is controlled by a lever near the handle bar. The large tank-type scrubbers are particularly designed for larger floor areas where they do the bigger job much faster than the converted polisher. They consist of a divided tank, one portion of which is for the cleaning solution, and the other for holding the dirty solution picked up by the vacuum attachment. A long squeegee follows directly behind the brush or brushes, collecting the dirty solution in front of the suction attachment.

The floor machine should be kept clean. The housing over the brush in many cases is either cast or spun aluminum. If rubbed off frequently, it will retain its original polish. If cleaning solutions are left on the housing, wheels, etc., the surface will deteriorate; if the solution is alkaline, the deterioration will be more rapid and more severe. Alkali is an "enemy" of aluminum. After use, rinse the scrub brush and hang it up on a peg or nail to dry. In fact, all floor machine brushes should be hung and never stacked or allowed to lie on the bristles. When the machine is in storage, if only for a few hours, the weight should not rest on the brush. Avoid getting moisture in the motor and follow the manufacturer's instructions regarding the lubrication. Too much oil, heated in operation, may expand and burst an oil seal, causing the machine to leak oil. Do not tamper with any of the enclosed portions of a floor machine. If your machine is still under the manufacturer's guarantee, take the trouble up with the manufacturer. Otherwise, you may forfeit the guarantee. If your floor machine is not under a guarantee, turn the problems over to the maintenance department for repair.

All run-of-the-mill scrubbing is done with a regular scrubbing brush underneath the floor machine. There have been two types of abrasive pads developed for scouring floors. These are used underneath the regular scrubbing brush in some cases, while in others special holders or adapters have been designed to accommodate these pads. The two types of abrasive pads are (1) the familiar metal wool pads which are still used extensively and (2) the new silicon carbide coated pads.

Metal pads. Oil is used as a lubricant in cutting steel wool during the manufacturing process and because a residue of oil remains on the wool, rusting in stock is prevented. However, after the wool has been used for scrubbing, it will rust unless rinsed, and after drying, is dipped in kerosene. Steel wool is flammable because of the oily residue and caution against ignition should be observed. Stainless steel wool will not rust, but is more expensive and is too harsh for the resilient floors, though it may be used on wood or concrete. No steel wool should be used on marble or terrazzo. The stainless type may cause scratches on these floors and the conventional steel wool may leave particles of the wool to rust and stain the floor. Other types of metal such as bronze or aluminum are also used in the manufacture of wool pads, but their use is limited.

Conventional steel wool is available in eight grades of texture ranging from the very fine grade No. 0000 to grade No. 4. However, the extreme grades are seldom used. The more popular being grades No. 00, No. 0, No. 1, and No. 2. No. 3 is used for heavy deposits or where a limited grinding action is needed, such as on cork floors. The finer grades, such as No. 00 and No. 0 are often used for dry polishing floors, especially waxed floors.

By far, the most extensive use of steel wool consists of scrubbing floors and stripping old floor wax. The wool not only performs a cutting action on the accumulations but, because of its loose texture, it largely absorbs what it removes, making it more continuously effective.

There are two popular types of steel wool pads--the solid disks and the "doughnut" type. Where a regular steel wool holder is attached to the floor machine, the solid disks are more effective since a greater cutting or buffing surface is provided. Where the pad is to be used under a floor machine scrub brush, the "doughnut" type serves satisfactorily since there is no pressure in the center of the pad.

Steel wire brushes hold a wool pad firmly and are used frequently for the purpose. There is, however, always the danger of the wire bristles going through or off the pad and scratching the floor.

Because No. 0 grade wool may be considered "medium" or halfway between "fine" and "coarse" along with No. 1 grade, it is in more general use than the other grades. Therefore, when in doubt which grade to use, begin with No. 0 and change to a finer or coarser grade as conditions require.

New abrasive pads. Several types of scouring and buffing pads have recently been introduced which have taken their place along side of steel wool pads as effective floor maintenance tools. Several very popular abrasive pads are made from non-woven nylon. Some manufacturers die-cut the disk from 1/4" thick material, whereas other manufacturers cut strips 3/4" thick which are then spiralled around so that the resulting pad is 3/4" thick. All the pads are treated with abrasive material. The most popular abrasives used are silicon carbide, pumice and garnet. Each of these abrasives produces a pad which has a different degree of agressiveness.

Nylon pads have the advantage of being rust proof and also practically non-destructible. It is true that they eventually wear out, but they do appear to have a rather long life. Some of these pads are used with a driving pad under a floor machine. This driving pad has a textured-rubber friction face and sponge rubber backing, and is glued to the wooden brush block or metal steel wool holder. Thicker 3/4" pads do not need such a driving pad but can be used with the same driving surface as ordinary steel wool. There is no objection, however, to using them with a rubber driving pad.

Recently, other substances have been worked into the polishing and scrubbing pads. Several companies have produced a pad of polyurethane with an abrasive coating. It does not seem to have the porosity of the nylon types, but in certain areas has worked well. Another development has been a rubberized curl hair pad, spread with a resin and abrasive on one side. It is quite agressive and originally designed for stripping operations.

Another product consists of a wide mesh fabric which is also treated on both sides with silicon carbide, resembling a screen, making it reversible. It is used under a steel wool pad; the latter being attached either to the steel wool holder or to the scrub brush of a floor machine. These "screen" type pads are especially usable for stripping old floor wax. The open mesh of the pad is specifically designed to prevent loading of the pad with dislodged wax or other accumulations. When the pad needs cleaning, it can be held under a faucet where the flow of water through the pad will restore it to its original condition. The screen type pads are available in four different degrees of abrasiveness. They are not, however, designed for polishing.

The foregoing pads are usually manufactured for use with a disk type floor machine. In addition, the manufacturer of these pads usually produces small rectangular pads of the same material for hand use around the edges of the floor and in other cleaning jobs where agressive action is needed.

Water pickup equipment. As previously mentioned, the picking up of water can be one of the most effective functions of an industrial vacuum cleaner. Such a vacuum equipped with the water shielding device inside, and with a rubber squeegee blade on the pickup head, can remove solutions of dirty water and loosened wax in a manner which is impossible to achieve with other equipment.

Where water pickup vacuum equipment is not available, the use of a large rubber squeegee set on the end of a long push broom handle can prove beneficial in handling large volumes of water on the floor. Where a floor squeegee is used, and there is no floor drain, the water can be squeegeed into a water tight pan very similar in design to an oversized dust pan.

Where either of the two previously water pickup methods are not available, then the custodian must resort to picking up the dirty solution with a mop and wringing it into a container.

Scrubbing Procedure

Thorough scrubbing is not a frequent operation; most areas in the schools are scrubbed only two or three times a school year. Since all floor finishing is preceded by a thorough cleaning, proper planning, preparation, and execution of the scrubbing phase is essential. If it is done in a haphazard manner, a residue can be left on the floor which will cause an improper bonding of the floor finish or mar the appearance of the finished floor. In addition, several types of floors can be ruined by improper cleaning techniques.

The following steps are an outline for scrubbing in general. Cautions and notes for specific types of floors follow them:

1. Clear the area to be scrubbed:

   Move furniture in an orderly fashion so that it may be replaced easily. Lift furniture, do not drag it across the floor. Unplug all electrical appliances.

2. Assemble equipment and supplies:

   2 buckets and wringers
   2 wet mops
   Floor machine (with appropriate brush and pad)
   Putty knife
   Cleaner
   Abrasive powder
   Hand pad
   Dust mop
   Dust pan
   Counter brush
   Clean cloths

3. Dust mop area to be scrubbed:

   To remove as much dirt and litter as possible before scrubbing.

4. Prepare cleaning solution:

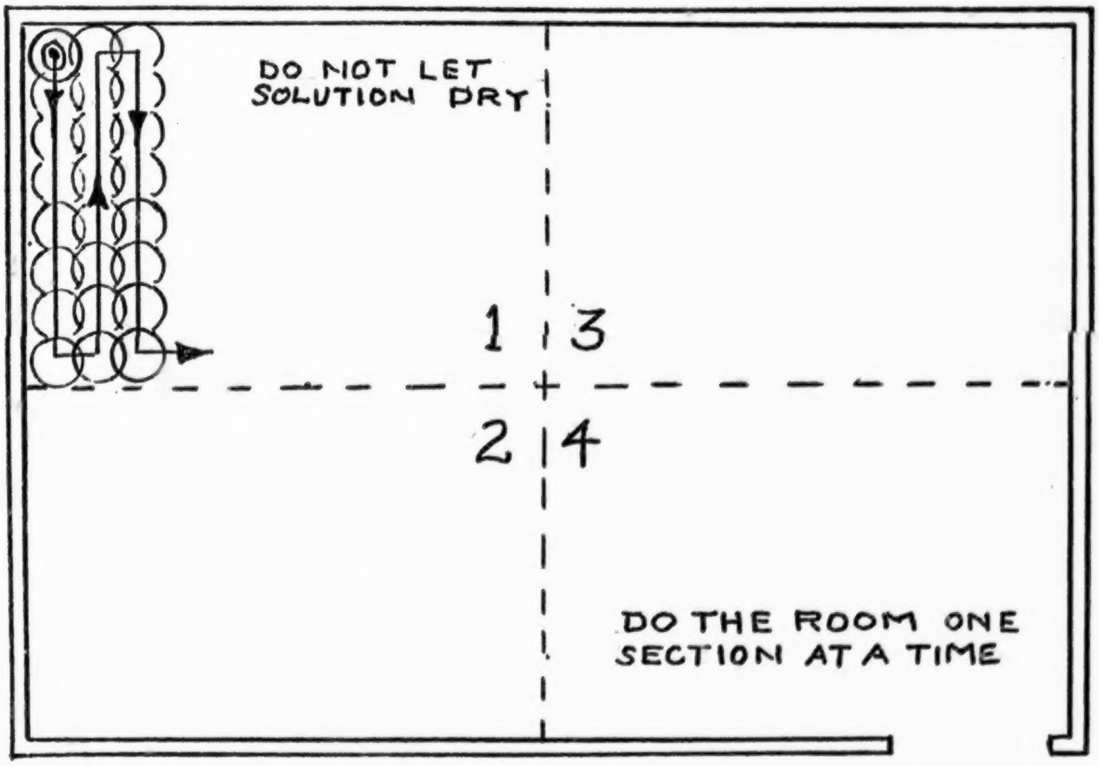
   Use a measuring cup and mix according to manufacturer's directions. Also, fill rinse bucket.

5. Apply cleaning solution to the floor:

Refer to wet mopping procedure. If a one-man operation, apply to about a 10' x 10' area only, so it won't dry before it can be worked. If using a crew, a larger area can be kept wet constantly by one man. Avoid excessive flooding.

6. Machine scrub floor:

Only the wet area. Travel slowly but continuously. Use overlapping pattern. (See illustration). Carry solution on floor with the machine.



7. Heel the machine:

For the hard to remove spots.

8. Apply small amount of abrasive powder:

For spots that persist. Put powder on the spot only. Keep the dispenser close to the floor to prevent powder flying about.

9. Make a second pattern at right angle to first:

To ensure complete coverage.

10. Scrub corners and along baseboards:

Use a hand pad. Cleans these areas as you come to them. Avoid splattering if possible.

11. Wipe spattered baseboards, walls, and stationary equipment:

    Use a damp cloth if spattering does occur.

    Wipe immediately, do not let dry.

12. Pick up dirty cleaning solution:

    Use well wrung out scrubbing mop or mechanical devices.

13. Rinse scrubbed area thoroughly:

    Use second mop for rinsing and rinse water pickup (or vacuum pickup).

    Several rinsings may be needed.

    Leave floor as dry as possible.

14. Continue entire routine until total area has been done, changing cleaning solution and rinse water as often as needed.

15. Damp wipe machine and polish dry.

16. Clean other equipment and return to storage.

Notes for specific floors:

Wood - Avoid excessive use of water. Do not use strong alkaline cleaning agents. Scrubbing and wet mopping will ultimately damage a wood floor; water will raise the grain of the wood, weaken the bond if the floor is bonded to a sub-floor, discolor, cause the wood to have a musty odor, and possibly rot it. Oil has the effect of softening the grain, darkening the color, and creates a sticky surface which holds dust. Strong, harsh alkaline cleaners raise the grain, will cause stains and darkens the color.

Asphalt Tile - Avoid excessive amounts of water. If it remains on the floor too long it may seep between joints and work underneath, loosening the tile. Hot water will soften the tile itself. Use cool or lukewarm water. Avoid strong alkaline cleaners. Use a neutral detergent.

Vinyl - Resistant to most alkalis and solvents. Avoid acid cleaners. Abrasives can be used for heavy soil build-ups, but avoid continuous use.

Rubber - Soap is harmful to rubber. Use a neutral detergent. To remove a heavy "film", abrasive powder, abrasive nylon pad, or No. 1 grade steel wool may be used. If colors "bleed" due to improper cleaning, use No. 1 grade steel wool or nylon abrasive pad to remove. Repeat scouring and rinsing until "bleeding" is no longer evident.

Linoleum - Strong alkaline cleaners combine chemically with linseed oil in linoleum forming a soaplike substance and which breaks down the linoleum structure. More linoleum is "washed out" than worn out. Excessive water can seep under and loosen the backing. Avoid hot water and abrasive powders. Use grade No. 0 steel wool for scouring.

Cork - Alkalis will attack the resinous binder and the floor adhesive. Use a neutral detergent. Excessive water will loosen floor adhesive. For abrasion use nylon pad or grade No. 0 steel wool.

Ceramic and Quarry Tile - Acids will react with alkalinity in grouting, softening and destroying it. Strong alkalis seep into the pores of the grouting and exert tremendous pressure as they expand when drying and returning to crystalline form. Don't use steel wool for abrasion. The tile is harder than steel wool and abrades it, discoloring the tile.

Marble - Acids dissolve the basic structure of marble (carbonate of lime). Harsh abrasives will scratch its soft surface. Soap will leave a dulling film; use a neutral detergent.

Terrazzo - Strong alkaline cleaners are prone to deposit salts which enter the pores of both the marble chips and the cement grouting. These salts expand on drying causing the chips to pop loose and the grouting to dust. Avoid steel wool for abrasion. The fine steel wool chips will rust and stain the floor. A soap cleaner changes to a calcium grease in the presence of the calcium of the floor forming a "film". Use detergents for cleaning.

CHAPTER 4

FLOOR CONDITIONING

Conditioning and Re-conditioning Floors

The removal of old finishes from floors entails a variety of processes ranging from mere washing to sanding. Not only do the methods differ in relation to the kind of finish to be removed, but also in relation to the kind of floor from which the old finish is to be removed.

The more common task in floor maintenance is the removal of old floor wax. This should be completely removed before re-sealing or finishing or the new finish will neither dry nor adhere properly. This may require several cleanings.

Where the floor is to be rewaxed only, one good stripping operation usually suffices. The solvent type waxes do not require complete removal as often as the water waxes. Where a solvent type wax is to be removed and the floor re-waxed, it can best be done with fresh liquid solvent wax poured on the floor and scrubbed with a nylon scrubbing pad or No. 1 steel wool, wiping off the surplus before it dries.

In the case of the water waxes, which frequently build up where traffic is limited, turning yellow or brown, stripping is the only remedy. This is best done with a regular wax stripper which is spread over the surface, allowed to set for several minutes, and then scoured with No. 1 or No. 2 steel wool or one of the new abradant pads.

Some water waxes are easily removed while others are more tenacious, being purposely made water resistant. However, the age and thickness of the wax film have much to do with the removal problem. The older and thicker, the more difficult.

Most prepared wax strippers are of an alkaline nature, in which case they must be used with discretion on linoleum or cork tile. After removal, rinse thoroughly with a weak vinegar solution to neutralize the alkalinity. In some cases where the old wax is removed several times a year, a strong solution of non-alkaline synthetic detergent, along with steel wool or an abrasive pad, will remove the old wax with safety.

Regular wax strippers are usually diluted with water for use, in which case hot water makes them more effective. When the floor is to be re-waxed, however, it is not essential that all old wax be removed, being sure only that the floor is clean with no discolorations.

Abrasive powders are also used, in many cases quite successfully, for removing old wax films, especially from linoleum; in which case, a limited portion of the floor is wetted and the powder sprinkled on freely. After a minute or two the floor is scoured with a stiff brush.

The removal of old finish from wood floors is rather detailed and is best left to the maintenance crew when they are doing the annual reconditioning of wood floors.

The following are some specific notes for conditioning particular floors. Some of these notes pertain to cautions to be used in conditioning the floors, others to certain peculiarities of the floor itself:

Terrazzo. Where a terrazzo floor is stained or very dark, especially along the wall bases, it is suggested that you make a "white wash" of abrasive powder and hot water and coat the stained surface. It is advisable to do this immediately after the surface has been washed with warm water. Let the coating set for about 24 hours, after which use the same solution to scrub the surface. The floor should be thoroughly rinsed after this "white wash" has been removed.

Asphalt Tile. Where an old wax accumulation is to be removed, use a regular wax stripper, one designed for asphalt as well as other floors. Spread the stripping solution over the floor and allow it to set for several minutes. Then scour, preferably with No. 1 or No. 2 steel wool or an abradant pad. Where a wax stripper is not available, use a scouring powder.

In applying a water wax for the first time to a new asphalt tile floor, the wax may have a tendency to "crawl" (like water on grease) and if allowed to dry, a spotty, unsatisfactory finish will result. This is due to surface tension; to overcome it, the new floor should be cleaned with a good cleaning solution before being waxed.

Rubber Tile. After a period of mopping with clear water or with a a detergent, an accumulation scum or stain may develop, so uniform in appearance as to be almost indiscernible. The mopping, which too often becomes a routine process, leaves a little residue of soil each time, spreading it over the floor evenly, tending to dull the colors. Such a condition is readily established by rubbing a small spot with a soap-impregnated steel wool pad. A general mild scouring is then needed to restore the original brightness of the colors. This may be done with an approved detergent, water and steel wool (No. 1 grade). An abrasive pad or an abrasive powder may be used instead of the steel wool.

To use the abrasive powder, first wet a limited portion of the floor at a time and then sprinkle the powder on freely. Scrub with a stiff brush and rinse well.

Marble. In cases where a grayish film develops on white marble, and also on colored marble, dimming the colors, The Marble Institute recommends the following procedure for removing the film:

"Place two pounds, or about 1 1/2 quarts, of abrasive cleaner in a 12-14 quart pail. Add about 4 quarts of hot water and stir thoroughly. Fill the pail with water and, while stirring constantly, apply the mixture to the marble with a broad brush in the same manner as applying a white wash. After this has dried, wet a fiber brush in the same solution, dip it into the abrasive powder, and scrub vigorously. Wash down the surface with a hose or otherwise rinse thoroughly with clear water. Wipe dry after rinsing to avoid streaking."

Marble's worst enemy is acid. When any kind of acid, especially in liquid form, comes in contact with marble, a chemical reaction begins. Marble, being of an alkaline nature, is the chemical opposite of acid. Strong acids react rapidly to dissolve marble, while mild acids react more slowly, roughening the surface. Even the fruit acids, if allowed to remain on the surface, will remove the finish.

Cork tile. Cork tile which has been in use is best cleaned with a neutral cleaner. While a neutral soap may be used, a neutral synthetic detergent is preferred which will clean equally well in hard or soft water and leaves no residue of its own. Soaps, unless well rinsed, may leave a film.

Alkaline cleaners of all kinds should be avoided since alkali is a natural enemy of the resinous binders used in cork tile; alkaline solutions seeping down between the tiles attack the adhesive. If the tile is badly soiled, use No. 0 grade steel wool, or one of the nylon abradant pads, in conjunction with the cleaning solution.

While non-alkaline abrasive cleaners may be used for cleaning very dirty cork tile, it is believed that they are less desirable for the open cell-like structure of cork than for use on the smooth, closely integrated surfaces on other types of flooring. Therefore, a steel wool or nylon abrasive pad is preferred with the proper cleaning solution.

Cork tile should not be cleaned with naptha, gasoline, or similar solvents as they may cause discoloration. When cork tile is discolored, often "dry cleaning" with dry No. 0 steel wool or a nylon abradant pad will serve. The silicon-carbide treated wide mesh pad should be especially effective. After a cork tile floor has been thoroughly cleaned, it should be given a protective coating since a freshly cleaned cork tile floor will resoil easily. After it has been cleaned and dried, it is suggested that one coat of a penetrating sealer or two coats of solvent type wax be used to seal the floor.

Old finished wood floors. By the term "old wood floors", it is meant any wood floor which has been in use and which has not been **freshly** re-sanded.

To recondition an old wood floor, the first step is, naturally, to clean it. If it has been waxed or coated with an emulsion resin finish, a wax stripper should be used along with No. 1 steel wool or an abradant pad. If it is merely dirty, soap or a synthetic detergent and water may be used. Only enough water to obtain results should be applied to the floor. The addition of the steel wool or nylon abradant pad will facilitate the cleaning.

Where there are authorities who object to the use of water in cleaning wood floors, solvent type cleaners are available. An effective method where the floor is not to be resealed, is to pour solvent-type liquid floor wax on the floor and scrub with a nylon scrubbing pad or No. 1 steel wool under the machine. Wipe off any surplus with clean, dry cotton mops and when the floor is dry, buff to a polish.

If the floor is to be resealed or the old sealer re-patched, the solvent wax method of cleaning should not be used.

Old oiled wood floors. Most of the oil may be removed by scrubbing the floor with a solution of 8 to 10 teaspoons of TSP in a gallon of hot water or with a commercial grease emulsifier solution used according to the recommendations of the manufacturer. This will help emulsify the old oil and neutralize any acid. It may be necessary in some instances to remove the old oil entirely. A good way to determine if the old oil is removed is to scrub the floor and allow it to stand a day or two. If any oil remains after the scrubbing, it will appear on the surface in dark spots. Scrub the floor until these spots do not appear. The floor should be allowed to dry several days before sealing with a penetrating seal.

Sealers

While any material which closes or fills the pores may be considered a sealer, in the floor finishing field we recognize as sealers only those which are adapted for permanent sealing and resistance to wear. Those types of sealers such as varnishes, shellacs, resins, and paints, will not be covered in this course since they are primarily tools of the maintenance department.

The manufacturers of resilient floors have in the past opposed the use of sealers, but now a type of sealer has been developed which seems suitable for these floors. This new type consists of emulsified plastics, which, when dry, form a tough, colorless, and elastic film. At time of writing, no report was available on the use of epoxy sealers on ceramics, terrazzo, and marble, but since these sealers are non- yellowing, it is possible that they may be used satisfactorily.

The generally accepted sealer for terrazzo and marble is a colorless plastic type usually thinned with xylol. It is comparatively thin in consistency and one application well rubbed out is generally considered sufficient since a surface film is not desirable on these floors. These plastic sealers, commonly called "terrazzo sealers", dry very quickly and, therefore, should be rubbed out rapidly during application to prevent streaks as the coating dries. Such sealers are intended merely to fill the pores of the floor to make the floor more resistant to soiling rather than to enhance the appearance. Recently, emulsified terrazzo sealers have appeared on the market promising improvement in the maintenance of terrazzo and marble.

Sometimes asphalt tile becomes faded and lifeless due to too much sunlight, excessive wear, or improper care. The original life and luster can be partially restored by the use of a sealer recommended for asphalt tile. These sealers are easily applied with a lamb's wool applicator or cotton mop; usually one coat is enough. Of course, the sealing coat must be preceeded by a thorough floor cleaning, using a wax remover and warm water. After sealing, the floor is waxed as usual.

CHAPTER 5

FLOOR MAINTENANCE FINISHES

The designation "floor maintenance finishes" means those which are applied at frequent intervals, such as floor waxes and the newer emulsified resins (sometimes called "hard coats"). Such finishes can be applied quickly and easily as needed, drying quickly so that the floor can be promptly returned to service. Such finishes can be readily removed and replaced as occasion may require, thereby differing from sealers, paints, etc.

There are today two dominant types of such floor finishes--the wax and the waxless (emulsified resin)-- and there is a fairly equal division of opinion as to which is the more desirable. Each has special advantages and features which govern its adaptability for certain purposes. The floor waxes themselves are divided into two general classifications-- the solvent type (both liquid and paste) and the water emulsion type.

Although there are still users who believe that the solvent-type waxes have greater durability than either the water waxes or the emulsified resin finishes, the solvent waxes have been losing popularity for the past 15 or 20 years, chiefly because they are adaptable only for certain floors; they are ruinous to asphalt tile and are undesirable on rubber. The water waxes and the resin emulsions, on the other hand, are adapted for use on any kind of floor except "raw" (unsealed) wood. On the latter, the solvent waxes may be used in successive applications over a period of time and result eventually in a very durable, attractive finish. The "water finishes", both the wax and emulsified resins, cannot be successfully used on "raw" wood. The water in them raises the grain and results in an unsatisfactory surface.

The fact that the water-waxes and resin emulsions dry with a gloss requiring no immediate buffing has ceased to be an important factor in establishing their current popularity. It is obvious that any finish subjected to traffic will soon show the results of abrasion or erosion. The wax finishes scuff, and the harder resin emulsions tend to scratch.

Although some manufacturers claim to have "everything" in their floor finish and conceeding that some finishes are better than others, an analysis of the relative qualities may indicate that certain advantages of one kind can be offset by certain advantages of another.

Take wax as an example: it is pliable and is a limited lubricant for friction. Because it is pliable it "gives" under the sliding pressure of feet rather than resisting and breaking. This quality makes it easy to remove the scuffs of traffic by buffing.

However, since wax does have these lubricative qualities, it has, under certain conditions, the disadvantage of being slippery. It can be made relatively non-slippery by the addition of colloidal silica, which replaces about 30% of the wax content but still provides a desirable finish which can be buffed the same as the regular waxes.

The emulsified resin finishes have limited lubricative qualities, being of a more rigid nature. The earlier products of this type, no more than emulsified shellac, were quite susceptible to scratches which could not be buffed out. However, great improvements have been achieved in the formulations and manufacture of the finishes. Though they cannot be said to be as buffable as wax, there are a number now which respond to buffing so that ordinary scuffs can be removed, though deep scratches can seldom be buffed out. Some of these emulsified resin finishes respond more readily to buffing if sprayed lightly with water just ahead of the polishing brush.

Most of the improved resin finishes contain polyethylene, a plastic which overcomes some of the undesirable features of the early products.

Since opinions of the relative merits of the water waxes and the emulsified resin are divided, the chief chemist of a large manufacturer of both products expressed the following opinion: If the floor is buffed daily, the wax finish is more desirable. If buffed less frequently, use the emulsified resin finish. In other words, unless buffed regularly, the latter finish will look better longer.

The methods for applying either of the emulsion finishes (wax or waxless) are the same.

Since both of the water waxes and resin finishes are emulsions, they differ only in the nature of the solids. In both cases, water insoluble material, reduced to minute particles by heating, is made water-tolerant by coating each particle with an emulsifying agent. If this coating is broken by acids, shock, or other adverse conditions, the emulsion reverses itself, the solids coagulate, and is ruined. Bacteria set up an acid condition causing the emulsion to reverse (as also does galvanized containers) especially if the emulsion contains ammonia, as most emulsions do. Although the gas from ammonia is offensive, ammonia is the best stabilizer for these emulsions. It remains an alkali in the product while confined in the container but quickly evaporates upon application to the floor.

Neither of the emulsions should exceed a pH of 9 nor less than a pH of 8. Below the latter acid is indicated, above the former excess alkali is present.

While these emulsions are much more secure from shock, such as freezing, than they were formerly, it is always advisable to protect them against excessive heat or cold.

Sometimes an emulsion in the early stages of spoiling (often indicated by thickening) can be saved by the addition of ammonia--about one ounce to each five gallons of the emulsion.

If a shipment of frozen emulsion is received, accept it but have the bill of lading marked "received frozen". Store the container in a warm (not hot) place until it thaws. If it dries with a gloss upon application, it has not been injured. If it dries dull or has separated, it is spoiled. If the fault is that of the carrier due to unnecessary exposure, a claim should be entered notifying the shipper who may help with the claim, though he may not guarantee safe delivery in very cold weather. Many of the manufacturers will delay shipping orders of waxes during some of the winter months when the weather at the plant or enroute would be such that the shipment might possibly be frozen enroute.

Solvent-type liquid waxes congeal when very cold, but if placed in a fairly warm room soon reliquify without injury. Heat, however, may cause them to separate.

While solvent waxes rarely exceed 12% in solids (more would cause congealing), the water waxes may be any percentage up to 18% or 20% and still remain liquid (or "creamy"). The heavier the wax content, the better the showing on the floor, but it seems to be the concensus of most authoritative opinion that 12% to 14% of any of the emulsion finishes is the most desirable for general use. In which case, two or more successive applications of wax, each buffed when dry, builds up a more durable, non-slippery finish.

The quality of all floor waxes depends largely upon the proportion of carnauba wax they contain. But the carnauba content is not the only gauge by which the quality is decided. Other ingredients and manufacturing processes are also guiding factors. In fact, solvent type waxes are a blend of several waxes since carnauba alone is too hard for a satisfactory mechanical mix such as the solvent waxes are.

Neither the waxes nor the resin finishes should be allowed to "build up" by successive applications. This is more important in the case of the emulsions than in the solvent type. Except when an old finish has been removed by a stripper, reapply the finish only where it has worn off rather than over the whole area. This will prevent a "building up" of film and subsequent discoloration in protected areas.

On the following page a chart has been compiled for comparison purposes showing some of the advantages and disadvantages of the different types of floor finishes. You will note that certain advantages and disadvantages appear in several classifications. In many instances, the decision as to which type of finish to use on a specific area will be governed by considerations other than those shown on the chart. For instance, in a "prestige" area, such as the school office, the lobby, or main entrance, a high gloss may be desirable. In such an area, buffing will be more frequent than in other areas. Therefore, it might be advisable to select a finish which responds readily to buffing and will give a high luster.

In other areas, such as classrooms where buffing is more infrequent, the type of finish which requires less buffing would be more advisable.

FLOOR FINISHES

ADVANTAGES				DISADVANTAGES
WAXLESS	EMULSIONS		1. Can be used on almost all types of floors. 2. Dries to gloss - immediate buffing not necessary. 3. Usually will not yellow 4. Dries to traffic in short time.	1. Will raise the grain on unfinished wood. 2. Surface scratches easily. 3. Rigid film - almost non-movable when buffed. 4. Can "sour" in open drum. 5. Has tendency to "powder" under traffic. 6. Difficult to buff back to a high luster.
WAX	EMULSION		1. Can be used on most floors. 2. Dries glossy - no immediate buffing needed. 3. "Movable" when buffed. 4. Can have up to 18-20% solids. 5. Traffic marks buff out and smooth luster regained.	1. Will raise grain on unfinished wood. 2. Soft surface scuffs easily. 3. Can be slippery. 4. Yellows with age. 5. Will "sour" in open drum.
	SOLVENT	LIQUID	1. Great durability. 2. Polishes to hard finish. 3. Movable when buffed.	1. Not adaptable to all floors. 2. Ruins asphalt tile. 3. Undesirable on rubber. 4. Scuffs rather easily. 5. Can be very slippery. 6. Yellows with age. 7. Maximum 12% solids. 8. Must be buffed after application.
		PASTE	1. Same as liquid solvent type.	1. Same as all above with the additional labor needed to apply.

APPLYING FLOOR FINISHES

It is necessary when applying a floor finish to start with a clean dry floor. If some time has elapsed since the floor has been cleaned, it may be necessary to go over the floor with a clean non-oily dust mop to pick up any dust which may have settled on the floor.

Always use scrupulously clean equipment when applying a floor finish. Any dirt which may be on the applicator or any of the equipment will be transfered to the floor finish and can ruin an otherwise perfect finishing job. There are two methods in common usage for applying the finish. One method uses a cotton string mop, a pail, and a mop wringer. The other method uses a shallow pan and lamb's wool applicator. If it is preferred to use the mop method, have a separate clean mop set aside for just this purpose. Most custodians label the mop "For Waxing Only", printing these words in large letters on the wooden handle with a felt tip marking pen. In any case, do not use a mop head which has been used for scrubbing.

The mop method is a good, fast method for waxing large floors and can be done in either of two ways. Put the wax in a wringer pail and dip the mop into it; squeeze the mop until it seems dry and then apply the wax to a section. Or dip the heel of the mop into the wax solution and hold it upright, letting the wax run down into the cotton yarn. These are both good methods and they are more than twice as fast as using an applicator. A thinner coat of wax can be applied with a mop than with an applicator and the coat will have fewer streaks. The best method when using the mop consists of pouring some water wax into a clean wringer pail. Dip the clean mop into the pail and wring it until the wax no longer drips from the mop. Then, starting in one corner of the room, apply wax with a mop to an 8 x 10 ft. floor area with a figure eight motion. Wax to the baseboards first. Then fill in figure eight strips. Apply wax as thinly as possible.

In using the lamb's wool applicator, pour the wax into a shallow pan. Dip the applicator into the wax and press it against the side of the container to squeeze out the excess wax. Wax a strip along the baseboards first and then commence applying the wax to the rest of the floor.

Usually one gallon of wax will coat between 1800 and 2000 sq. ft. of floor area.

After this first coat has dried, (from 30 to 45 minutes, depending upon weather conditions), it may be buffed. Use either a polishing brush, a fine grade nylon abradant pad, or grade No. 00 steel wool. After buffing, either vacuum or dust mop the area before applying the second coat of wax. When possible, it is advisable to allow 24 hours between applications of successive coats for better drying. When the second coat has dried, buff it also. The heat of friction will tend to fuse the wax particles, strengthening the film and providing longer life.

CHAPTER 6

MAINTENANCE TIPS

MAINTENANCE OF FINISHED FLOORS

A certain amount of maintenance of a finished floor is necessary between complete new finishings. This includes mopping, scrubbing, and dry cleaning. Many custodians add approximately one pint of floor finish to the final rinse water when scrubbing a finished floor. This small amount of floor finish in many cases replaces the amount of finish which was taken off during the scrubbing operation.

In many areas, such as around drinking fountains, in doorways, near entrances, in front of elevators, and in the area in front of the classroom where the teacher stands during the day, it may be necessary to spot refinish. This is done by cleaning the spots and then applying a thin coat of floor finish just to the spot. Re-waxing the entire room is not necessary.

"Dry cleaning" a floor between waxings will aid in keeping the floor clean and helps extend the life between refinishing jobs. This is done by buffing the floor with either a fine grade nylon abraded pad or grade No. 00 steel wool underneath a floor machine. Always dust mop the floor thoroughly before and after the dry cleaning operation. If any fine steel wool particles are left on the floor after a dry cleaning operation, they will rust and stain the floor.

Many custodians are now using a technique known as "spray buffing" in prestige areas and in heavy traffic lanes. This technique combines cleaning, (to a minor extent) refinishing and polishing, all in one operation. The technique consists of spraying a fine mist of spray buffing solution in an area approximately 3 ft. by 3 ft. ahead of the buffing machine. The use of a nylon abradant pad under the machine is preferable for this procedure. The fine coating of mist on the floor is buffed until the floor is dry and has a gloss again.

The spray buffing solution is made up locally by the following procedure: In a pint container, mix one-half pint of floor finish, one-half pint water, and slightly less than one teaspoon full of a neutral synthetic detergent. Mix this combination of ingredients well and use it in a small plastic spray bottle. There are attachments for the floor machine which can be purchased which includes a tank for holding such a solution, a spray nozzle on the front of the machine, and the necessary piping. However, using the hand sprayer appears to be most popular.

This technique works in the following manner. The water and slight amount of detergent in the solution loosens the dirt on the finished surface. Mechanical agitation by the pad underneath the floor machine completes the cleaning process. The dirt is absorbed into the porous nylon pad. The thin floor finish in the solution is deposited onto the floor and is buffed to a hard glossy finish by the abrasive action of the pad.

Skill in the use of the technique is developed by practice. Avoid applying too heavy a film of the solution. If too much solution is applied to the surface, the action then tends to remove what floor finish is already on the floor. An application of the mist to too large an area tends to dry out before it can be buffed out.

FLOOR
MAINTENANCE CHART

KIND OF FLOOR	CLEANER TO USE	CLEANERS TO AVOID	FINISHES TO USE	FINISHES TO AVOID	SEALERS TO USE	SEALERS TO AVOID	OTHERS TO AVOID
Asphalt	4-8-9-10	2-3-5-6-7	11-12-17	13-15-16	18-23	Solvent Type Sealers	Oils, Solvents Alkalies
Ceramic	2-3-4 8-9-10	5-6-7	11-12-17	13	None*	None*	Acids and Strong Alkalies
Concrete	All except 5 & 6	5 & 6	11-12-15-16-17	13	All	None	Acids and Strong Alkalies
Cork*	4-8-9-10	2-3-5-6	11-12-15-16-17	13	19-20-22-25	None	Alkalies
Linoleum	4- -8-9-10	2-3-5-6-7	11-12-15-16-17	13	18-23	All others	Alkalies
Marble*	2-3-8-9-10	5-6-7	11-12-17	13	23	Solvent type	Acids, Alkalies and Harsh Abrasives
Oxychloride	2-3-4-8-9-10	5-6-7	11-12-15-16-17	13	23	Solvent type	Acids and Strong Alkalies
Rubber	-8-9-10	3-4-5-6-7	11-12-17	13-15-16	None	All	Oils, Grease
Terrazzo*	2-3-4-8-9-10	5-6-7	11-12-15-16-17	13	23	Solvent types	Acids and Strong Alkalies
Vinyl	2-3-4-8-9-10	5, 6 & 7	All except 13	13	None	Solvent types	Strong Alkalies
Wood	4-7-8-9-10	2-3-5-6	15,16,17	11,12	19-20-22-25	23	Strong Alkalies

CLEANERS

1. Abrasive Powders*
2. Powdered Cleaners*
3. Sodium Metasilicate
4. Neutral Soap
5. Oily Dust Mops
6. Oily Floor Sweep
7. Solvent Type
8. Synthetic Detergents
9. Wax-Treated Dust Mops
10. Wax-Treated Floor Sweep

FINISHES

11. Wax Emulsion Finishes
12. Synthetic Emulsion Finish
13. Floor Oil
15. Solvent Liquid Wax
16. Solvent Paste Wax
17. Polymer Gel

SEALERS

18. Alcohol Cut Resin
19. Alkyd Type
20. Bakelite Type
22. Epoxy Type
23. Synthetic Water Emulsion
25. Urethane

* NOTE: For cleaning marble, sodium metasilicate should be used in solu tion of ½ to 1 ounce per gallon of hot water. Rinse thoroughly. Avoid use of abrasive cleaners with harsh or coarse aggregates or those con taining ammonia concentrates or coloring material. Use of abrasive cleaners should be limited to occasional necessary scourings. Wax treated dust mops and wax treated floor sweep may be used on same floors. Sealers should be used on cork only when freshly sanded. Finishes with water vehicle should be used on wood only when the wood has been sealed. Preferences are not to be construed by above. Items indicated are simply adaptable, less suitable or objectionable. The alkalies recommended in the "Cleaner to Use" column are mild alkalies and are not injurious to the floor itself but when used on tile floors, especially the resilient floors, if too much solution is used it may seep down between the tiles and attack the adhesive. Continued use of alkali on Ceramic Tile is said to gradually cause disintegration of the grout. For terrazzo only a cleaner with a pH below 8 should be used for routine maintenance. Sealers on ceramic to be used for corrective or restorative purposes only.

APPENDIX

TRAINING SCHEDULE
"FLOOR CARE"

Time	Monday	Tuesday	Wednesday	Thursday	Friday
0:10	Intro & Registration	MOPPING Lecture & discussion	STRIPPING Lecture & discussion	DEMONSTRATION: Applying finish to floor stripped on Wednesday	Buff second coat on tile floor finished on Thursday
-					
0:20	TYPES OF FLOORS - Lecture, Slides, Samples				
-					
0:30		DEMONSTRATION: Mopping		HARD FLOORS: CLEANING METHODS Lecture & discussion	SPOT FINISHING Lecture & demonstration
0:40			DEMONSTRATION: Stripping (Asphalt tile)		
0:50		SCRUBBING Lecture & discussion			
1:00					OVERALL REVIEW
1:10					
1:20	BREAK				
1:30	SWEEPING: TOOLS, & PROCEDURE Lecture, Demonstration	BREAK		BREAK	
1:40		DEMONSTRATION: Scrubbing	BREAK	DEMONSTRATION: Cleaning a terrazzo floor.	
1:50			FLOOR FINISHES Lecture & discussion		BREAK
2:00					FINAL EXAMINATION
2:10	STAIN REMOVAL Lecture, Demonstration				
2:20					
2:30				Apply second coat of finish to floor used in first period.	
2:40					
2:50	DAILY QUIZ # 1	DAILY QUIZ # 2	DAILY QUIZ # 3	DAILY QUIZ # 4	
3:00					